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ABSTRACT

Two middle schools, one junior high school, and two senior high schools participated in a study conducted from 1977-81. The study project included both development and research activities. The goal of development activities was for each school to start or refine administration-organization arrangements and improvement strategies. Research activities had four main objectives, all related to the development of the school's improvement capability: (1) maintain a satisfactory level of student achievement in selected areas from year to year or raise an unsatisfactory level; (2) determine the extent to which each school could implement a research method and three comprehensive improvement stategies; (3) relate changes occurring in student outcomes from year to year to three areas--planned improvements made annually by each school staff, planned changes not directed specifically toward selected student outcomes, and unanticipated events; and (4) generate knowledge regarding usable and effective improvement strategies and school structures and processes that facilitate implementation of improvement strategies. In this report of the five schools participating in the research project, in-depth profiles are presented of each school, with discussion and analysis of implementation of improvement programs and outcomes. (JD)

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IMPROVEMENT OF SECONDARY EDUCATION THROUGH RESEARCH: FIVE LONGITUDINAL CASE STUDIES

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The 4200 students enrolled in the five schools spent many hours each year taking tests and inventories. Without this participation the study could not have been conducted. We hope that their participation contributed to better education for them. It is now contributing greatly to the betterment of the education of many other students.

John Daresh, now Assistant Professor of Educational Leadership at the University of Cincinnati, served as a project associate for two and one-half years and assisted the schools in their data analysis and provided many other services to the project. Ronald Serlin, Associate Professor of Educational Psychology, determined the particular analyses of the data that were performed, supervised the computer analysis, and reviewed and edited this manuscript. Graduate student Monica Zindler assumed responsibility for the computer data processing, from inputting the information starting in August, 1980, through receiving the output and completing most of the table preparation in August, 1982. Graduate students Louise Middendorf and Daniel Probst served consecutively as project assistants from January, 1978, to January, 1982. Thomas Sipple, project specialist, worked on an hourly basis to aid in the final tabling of the data and the proofreading of the various drafts of the chapters. Janet Lindow, Julie Bixby, and Donna Mlsna consecutively provided parttime secretarial assistance from October, 1977, to August, 1982. The Wisconsin Center administration and support personnel were helpful in many ways, including the final word processing and production of this monograph. The contributions of all of the Center persons are deeply appreciated.

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Herbert J. Klausmeier
April 1983

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Foreword

Research was conducted cooperatively with two middle schools, one junior high school, and two high schools during the years 1977-78 through 1980-81. The schools are located in three states in a small town, rural area, two suburban areas, and a large city. The student enrollment of the five schools combined was approximately 4200 each year.

The main purpose of the research was to determine the extent to which each school could implement three improvement strategies and make operational various organizational structures and processes that facilitate implementation of the strategies. The three improvement strategies are designated as individual educational programming, individual instructional programming, and goal setting. These strategies and the facilitative structures and processes are incorporated in a design for the renewal and improvement of secondary education. A school that makes progress annually toward attaining desired student outcomes by implementing the improvement strategies is regarded as having developed its own improvement capability.

Each school focused its improvement efforts on raising an undesired level of achievement in English, mathematics, and reading, or maintaining a desired level. Each school for at least one year worked toward improving the attitudes or the attendance of its students. Three schools gathered data on other student outcomes but did not direct any effort toward improving them. Each school determined the norm-referenced and locally constructed achievement tests and the inventories and questionnaires to administer to all of its students each year. Each school summarized and analyzed its data descriptively and used the information in planning its improvement activities. The schools provided the data on each student to the project so that the data could be analyzed for all four years. Each school provided three other kinds of information to the project: planned changes focused on improving student achievement in English, mathematics, and reading and, if relevant, attitudes or attendance; nonspecific planned changes related to other student outcomes; and unanticipated events that occurred that might have influenced student achievement, attendance, or attitudes.

The project analyzed the achievement data on a cross-sectional basis by analysis of covariance with mental ability the covariate. This permitted comparing the achievements of groups of students enrolled each year in each grade of the school, for example, comparing the English achievement of the grade 10 students of 1977-78, 1978-79, 1979-80, and 1980-81. The changes in student achievement from year to year were related to the unanticipated events, the nonspecific changes, and the improvement activities carried out in implementing the improvement strategies. The achievement data were also analyzed for the students of each longitudinal cohort, that is, the students who entered the first grade of the school, took all the tests, and completed the last grade of the school.

Each school implemented the educational programming strategy, the instructional programming strategy, or both during the first two years of the project but implemented the goal-setting strategy for the first time in the third year, 1979-80. Student achievement typically was not significantly different in the second year from the first year. However, the concurrent implementation of the goal-setting strategy and one or both of the other strategies in the third and fourth years resulted in raising student achievement significantly in 67 comparisons of the last two years with an earlier year, maintaining the same level of achievement in 69 comparisons, and not maintaining it in three (all in reading vocabulary in one school). Moreover, in a number of the nonsignificant comparisons, the students were already achieving quite high in the third year. Accordingly, implementing individual educational programming, individual instructional programming, or both was instrumental in maintaining the same level of achievement from year to year while goal-setting was necessary for consistently raising it. The findings based on the longitudinal data support these cross-sectional results.

Student attendance and attitudes became slightly more positive from year to year when a school set goals to improve them, and they remained relatively stable when this was not done. When a school carried out activities only to maintain or to raise student achievement, little change occurred in student attitudes and attendance.

Based upon the consistently positive results, we conclude that the conceptual design that incorporates the improvement strategies and the facilitative organizational structures and processes provides relevant guidelines for the renewal and improvement of secondary education. In this context the design is considered to be validated as both usable and effective for improving education in schools having characteristics similar to those included in the present study.

The preceding positive results occurred despite some unanticipated events in each school that were judged to have negative effects on student achievement. One deterrent to attaining higher student achievement in the third and fourth years was a reduction in the staff and in educational programs. This occurred as student enrollment decreased quite sharply in four of the schools. We should recognize, too, that the National Assessment of Educational Progress found that the academic achievement of students of age 13 and 17 tended to go down during the 1970s. Accordingly, each school's maintaining the same level of achievement might be interpreted as a positive effect of implementing the strategies.

The present schools applied the improvement strategies to selected areas of student achievement and indicated the desired outcomes in terms of student performances based on standardized or locally constructed tests that they were already using in 1977-78. The schools might have selected other areas for improvement, selected other student outcomes, and used other measures of student performance. The design is not prescriptive in these matters. Rather, each school makes the decisions on these and other matters related to educational improvement.

The project analyzed the achievement data to identify differences between the mean achievements and the mean gains in achievement of the boys and girls of each school and among students of four levels of mental ability. These findings are presented and discussed. Differences between implementing the present design and acting on the results of school effectiveness research are also presented.

A postscript is in order inasmuch as two years elapsed between the last data collection in the schools and the publication of this monograph. In 1982-83 all five schools were implementing the goal-setting strategy and one or both of the other improvement strategies. They were continuing their organizational structures and processes.

A statewide secondary school improvement program was started in Wisconsin in 1981. A Wisconsin Secondary School Improvement Council was formed to expedite the program. The charter members included the professional education associations of Wisconsin, including those of teachers and administrators, the Wisconsin Association of School Boards, the Wisconsin Department of Public Instruction, seven teacher education institutions, and five other organizations directly concerned with secondary education. Two workshops based on the design were conducted annually for representatives of the Council and for individuals and teams from Wisconsin secondary schools, starting in 1981. In August of 1982 the Superintendent of Public Instruction of Wisconsin endorsed the design and committed the Department of Public Instruction to provide staff for the workshops.

As of April, 1983, individuals and teams of two to seven persons from 7 middle schools, 12 junior high schools, and 52 senior high schools had participated in six workshops. Neither funding nor time was available for a formal follow-up of the workshop participants. However, the results from a questionnaire and telephone calls indicated that many schools were implementing one or more elements of the design, such as individual educational programming or the goal-setting strategy.

CHAPTER 1

INTRODUCTION

Nationwide concern for the betterment of secondary education is reflected in the mass media as well as in the reports of various commissions and individuals. The concerns are with all elements of secondary education, including the curriculum, teaching, learning, evaluating, advising, and the process of improvement itself. Some concerns are with the education of a particular group of students, such as a language or ethnic minority, while others include the entire secondary school population.

These widespread concerns derive from a fundamental problem in secondary education, namely, local schools have not developed their own improvement capability. The inability to improve their own educative processes prevails in part because faculty members perceive their roles only as teachers, advisors, or administrators, not as members of a professional team working together to improve education in their school. Other deterrents to the development of an effective improvement capability by a school are obsolete organization structures and a lack of research-based improvement strategies. Along with these deterrents, changes in the family, the community and society at large result in demands on education that are increasingly difficult to meet.

The present project was carried out to ascertain the usability and effectiveness of a design for the improvement of secondary education. The design incorporates improvement strategies and school structures and processes that facilitate the implementation of the strategies. As a school becomes able to adapt the design to achieve desired student outcomes, it develops an improvement capability.

The conceptual design was formulated by the first author of this monograph when the project was in the planning stage. Subsequently, it was evaluated by the faculties of six middle schools and junior high schools (Klausemier, T. W., 1978) and in four senior high schools (Maier, 1978) as indicating desirable means and directions for improving secondary education. This initial version of the design provided the substantive framework for developing the improvement capability of each school participating in the present project and for conducting the related validation research with these schools.

Since no precedent for developing an improvement capability was found, the validation of the design was carried out as five intensive case studies over a period of five years. Two middle schools, a junior high school, and two senior high schools were selected to participate in the study. These schools are located in three states and in small town, suburban, or large city environments. The student enrollment of the schools ranges from 300 to 1400. Accordingly, the results of this study regarding improvement strategies and organization structures and processes that are common to the five schools should be generalizable to other schools with these characteristics. As will be discussed more fully in Chapter 2, the primary validation criterion in all five schools was that the implementation of the strategies would result in raising an unsatisfactory level of student achievement from year to year or in maintaining an already high level.

Since each school developed its own improvement capability, no two schools implemented the improvement strategies in an identical manner. Similarly, no two schools had identical organization structures. Therefore, the development of the improvement capability and the research proceeded somewhat differently in each school. Accordingly, the procedures and results are presented separately for each school in Chapters 3 through 7, one for each of the five schools. Chapter 8 presents a summary and discussion pertaining to all five schools.

This chapter introduces the conceptual design. It is based on an evaluation and synthesis of the recommendations of national and state commissions, the results of research, and input from practitioners and scholars. Since 1977, minor changes have been made in the design to take into account the findings from the present project as they accumulated from year to year and also recent theory and research related to school effectiveness (Edmonds, 1982; Purkey & Smith, 1982). The relationships between theory and research regarding school effectiveness and the results of the present research are discussed in Chapter 8. Looking forward to the discussion, we will see that a school that has developed its own improvement capability can respond intelligently to findings from school effectiveness research as well as to any other proposal for educational improvement.

Proposals for the Reform of Secondary Education

At the time this project was planned, many individuals, committees, and commissions had given serious attention to improving the education of American youth. They had tried to identify the problems of secondary education as well as the causes of the difficulties and had recommended policies and programs which presumably would eliminate the problems. A synthesis follows of the major recommendations of the panels and commissions of the 1960s and 1970s through 1977 (Brown, 1973; Coleman, 1974; Gibbons, 1976; Hostrop, 1975; Martin, 1976; Shane, 1973, 1977; Thomson, 1975; Toffler, 1974; Van Til, 1976; and Wirtz, 1977):

> Schools should personalize and humanize the educative process rather than continuing the three-track system of college preparation, general education, and vocational preparation.
>
> Multiple paths leading to high school graduation should be made available to students rather than requiring a certain number of Carnegie units for graduation and trying to enforce compulsory school attendance until age 18.

> Progress in learning and credit toward high school graduation should be based on demonstrated proficiency rather than on the amount of time spent attending class.
>
> Students should be given more opportunity and responsibility for planning and evaluating their educational programs.
>
> Greater emphasis should be given to preparing youth for work, for citizenship, and for their future familial roles.
>
> The educational resources of the community should be used much more as a means of promoting experiential learning, making career preparation more effective, and fostering adolescent interactions with children and adults.
>
> Students, teachers, parents, and other citizens should be represented on school councils and committees that deal with curriculum and instruction, student conduct, school governance, and other educational matters.

In 1976-77 there was considerable support for most of the preceding proposals. However, two other recommendations were made that aroused considerable debate and opposition.

The President's Science Advisory Committee Panel on Youth (Coleman, 1974) dealt with the period of transition from childhood to adulthood, roughly age 14 to 24. A hotly debated recommendation of the Panel was to provide vouchers enabling students to choose where they will be educated and when. One means of implementing this recommendation would allocate tax monies for educational purposes to the parents and students rather than to the local school district. The parents would then transfer the money to the public or private school which they select.

The National Commission on the Reform of Secondary Education, like other groups, identified many problems and made related recommendations (Brown, 1973). A recommendation that received widespread attention was to drop the legal school attendance age to 14. Carrying out this recommendation presumably would get physically mature students into productive work arrangements in the community. They could return for any desired form of education at any later time. To assure this, the Commission recommended legislation to guarantee students a total of 14 years of tuition-free education. After the compulsory eight years, up to age 14, they should be provided an additional six years of schooling, wherever and at such time as they decide to take the additional six years.

One aim of the preceding national commissions and panels was to influence federal and state legislation regarding education. Another was to influence local education practices as school administrators and teachers became aware of the problems and related proposals. A different and very interesting strategy was followed by the California Commission on the Reform of Intermediate and Secondary Education (Newcomber, 1975).

In 1974 Wilson Riles, Superintendent of Public Instruction of California, formed the 37-member California Commission for the Reform of Intermediate and Secondary Education (RISE). This Commission and its work had several interesting features. Its members included students, teachers, counselors, principals, and other school personnel, and also representatives of organized labor, farm groups, business, and the professions. All were residents of the state of California. They believed that their report was highly important. Another feature was that intermediate as well as high schools were included. This made it possible to take into account the emergence of the middle school as an appropriate response to the earlier physical maturation of the present generation of boys and girls. It also enabled the Commission to state aims of schooling that imply continuous progress of students from the intermediate grades through high school graduation. Perhaps the most important feature was that the California Department of Education would take responsibility for implementing the Commission's recommendations. The major recommendations of the Commission follow.

Learners as the Most Important Individuals in the School

Each learner should be recognized and accepted as the primary client to be served by the school. Parents, the community, and the larger society are secondary clients who will benefit from schools through the education gained by the learners. As maturing learners move toward adulthood, they should progressively be able to make more educational choices and also to assume responsibility for those choices.

Progress Dependent on Demonstrated Proficiency

The strengths and weaknesses of each learner should be assessed and, based on this assessment, each learner should be able to choose and pursue an instructional program consistent with the assessment and the learner's choices. When the learner demonstrates that he/she has attained the objectives of the instructional program, appropriate credit should be received. The learning activity should not be confined to the essential skills but should encompass attainment of all of the aims of California education.

A System of Multiple Options in Programs and Learning Styles

A wide variety of choices and options in program and curriculum content should be available to learners so as to enable them to meet personal objectives in varied ways according to each learner's own learning style. The alternatives or options might include schools-within-a-school, work-study programs, regional occupational training programs, special interest schools or centers, and departmentalized traditional programs. The multiple options for learning should allow the learner to take advantage of such opportunities as learning independently, learning in groups of varying size and composition, and learning in different locations, including the traditional school setting.

Gaining Skills and Knowledge in a Variety of Locations

Multiple opportunities are needed to enable students to gain first-hand experiences by means of study, observation, service, participation, and work in both the school and the wider community. Means of evaluation should be developed enabling learners to earn credit or other recognition through certain types of work situations, participation in community activities, or self-designed independent activities away from the traditional school setting.

Flexibility in Times for Learning

The hours, days, months, and school year should be flexible, extensive, and sufficiently varied to accommodate a diversity of interests, needs, and choices of individual learners. Class scheduling should be arranged to allow a learner to move freely from one activity to another on the basis of demonstrated proficiency. School sites and facilities should be available and used throughout the year and beyond the traditional school hours and five days of the week. School attendance requirements should allow a learner to leave the school system temporarily with the approval of the learner's parents and the schools. The furloughs should be of flexible duration, of educational value to the learner, and consistent with the learner's educational needs and objectives.

Personalized Instruction

The size and setting of the learning group should be based on the type of learning activity to be conducted. Groupings of learners should be small enough to offer a psychological and physical atmosphere that promotes the development of the learner's self-worth and identity within the school and community. All schools with large enrollments should be divided into several smaller schools to insure a more personalized setting. Middle schools particularly should give special attention to limiting school size because early adolescents have unique needs in learning to live and work with one another.

In addition to the preceding recommendations that affect all aspects of education, the California Commission recommended many changes in the curriculum in order for the learner to gain the skills, competence, knowledge, and values required to function effectively as an individual and a citizen today and during the last quarter of this twentieth century. Concerning proficiency in essential skills, the Commission recommended that each learner should achieve and demonstrate specified levels of proficiency in the following essential skills areas:

The communication skills of reading, writing, speaking, and listening.

Computational skills of addition, subtraction, multiplication, and division as well as in the use of decimals and percentages and in the understanding of the systems of measurement.

Ability to maintain a satisfactory level of physical conditioning and psychomotor coordination consistent with the individual's identified needs and rate of physical development. Also each learner should acquire an understanding of the health practices that will serve him/her throughout his/her lifetime.

Scientific and technological literacy, including a basic understanding of scientific principles and the ability to apply the principles to everyday situations.

Knowledge of American government and institutions and an understanding of the responsibilities of a citizen in a democratic society.

The skills needed for positive interaction with others in the school and with individual groups and institutions within the larger society.

Minimum levels of proficiency in reading, writing, computation, and in other essential skill areas as a condition of completing secondary education and receiving a high school diploma.

In addition to the explicit recommendations regarding proficiency in essential skills, the RISE Commission also made recommendations for the following:

Social concepts that reflect present and future needs of society, including its economic, political, social, and cultural institutions.

Cooperation, understanding of others, and mutual respect.

Processes of decision making.

Career awareness, exploration, and preparation.

Leisure time.

Aesthetic experiences.

The Commission did not assume that the preceding recommendations could be carried out, except as they are accepted by students and parents and by teachers and other school personnel. Also, mere acceptance of the desirability of the recommendations is not sufficient. Teachers and other educational workers must be given the opportunity to acquire new knowledge and skills to perform more effectively. As the school day is currently organized and as conditions for staff development activities are arranged, there is not time, opportunity, or incentive for teachers to acquire the knowledge and skills.

In accordance with this need the Commission recommended that, in order to gain and strengthen their knowledge and skills, teachers and other school personnel be provided with greater opportunities to design, conduct, and participate in a variety of staff development activities. A further recommendation was that the staff development programs be designed and administered primarily at the local or regional levels so that they will be responsible to the individual learners, the staff, and community needs. Therefore, staff members should assist in identifying their specific staff development needs, and programs should be designed to meet these needs. The abilities of individuals on the school staff should be identified and released time provided so that they may help other staff members improve their instructional techniques. Particularly needed are staff development activities directed toward arranging more appropriate learning activities for the individual student and techniques of evaluating student learning and instructional programs.

Learning and Individual Differences

The prior recommendations suggest changes that various groups thought would result in the improvement of secondary education. Principles of learning and the psychology of individual differences also imply directions for the betterment of secondary education.

Principles of Learning

Many theories of learning were extant in the 1970s. Although there are many possible applications of these theories, a few principles that facilitate learning have been identified in many learning experiments that have been carried out in experimental laboratories and in school settings (Klausmeier, 1976). Teachers seem to be aware of these principles, but school and classroom conditions do not always permit successful applications of the principles.

The first principle is that the learner actively engages in the learning activities during the time allocated for learning. This means that the student comes to the class, starts to work immediately, and continues to work on the learning activities until it is time to start other activities.

The second principle is that the learning activities are of an appropriate level of difficulty for the learner; they are neither too easy nor too difficult. The learner does not experience a sense of accomplishment by completing very easy tasks and experiences frustration after making unsuccessful efforts to perform tasks that are too advanced or too difficult.

A third principle is that the learning session is neither too short nor too long. Too little time means that nothing is learned well and accordingly it is not retained from one session to the next. Too much time results in boredom, even for the highly motivated student.

A fourth principle involves guidance of the learner. Guidance is interpreted broadly here to include teacher activities such as providing models, confirming correct responses, aiding students in correcting errors, and providing a proper balance of teacher-directed and student-initiated individual, small-group, and large-group activities.

Effective application of these principles secures maximum learning effectiveness over a short period of time, such as during a class period. To secure the maximum amount of learning over longer time intervals, such as during a semester or across a level of schooling, there must be continuity in the learning activities.

The conceptual design for the improvement and renewal of secondary education, to be discussed later, encourages teachers, curriculum coordinators, and other local school personnel to apply the short-term principles and also to provide for continuity in learning throughout the school years. In this regard, one serious learning problem of the 1970s was that an instructional strategy based on students' mastery of detailed performance objectives did not take into account the first four principles adequately, and there was a near total lack of continuity. No provisions were made for students to integrate, synthesize, or relearn; rather, they mastered discrete objectives once and then forgot what they had mastered.

Individual Differences

The preceding principles apply to students in general. However, their applications should take into account differences among individual students. Longitudinal research involving four groups of children and youth when in grades 1-3, 4-6, 7-9, and 10-12 indicates that the difference among the students of the same grade in their level of cognitive development are exceedingly great and that the difference increases at the successively higher levels of schooling (Klausmeier & Allen, 1978; Klausmeier & Associates, 1979). Moreover, some very rapidly developing students in grade 3 were found to be as advanced cognitively as other very slow developing students were in grade 12. Cognitive development as measured in this longitudinal study included understanding of concepts and principles drawn from the fields of English, mathematics, and science, and the ability to solve problems.

An intensive study of six rapid and six slow developers of grades 6 and 12 participating in this longitudinal study was undertaken (Mize & Klausmeier, 1977). The main purpose of the study was to identify conditions related to each student's individual and personal characteristics, school and education, and home and family that might contribute to rapid or slow cognitive development. The hypothesis was that one pattern of conditions contributed to rapid development and another to slow development.

Comprehensive information was gathered on each of the 12 students in order to answer the following questions:

1. Do students of rapid and slow cognitive development differ in
    a. Intellectual abilities?
    b. Self-esteem and perceptions of self?
    c. Self-directedness of behavior?
    d. Peer relations?
    e. Educational aspirations and life goals?
    f. Attitudes toward school and teachers?
    g. Rapport with teachers?
    h. Attributions of responsibility for academic performance?
    i. Use of leisure time (e.g., television viewing, reading, interests)?
    j. Home orientation, responsibilities, and perceptions of family?
2. Do parents and families of students of rapid and slow cognitive development differ in
    a. Demographic characteristics (e.g., divorce, education, number of children)?
    b. Family structure and family life (e.g., cohesiveness)?
    c. Attitudes and perceptions of the child?
    d. Attitudes toward children and child rearing?
    e. Attitudes toward school, teachers, and education?
    f. Values, goals, and aspirations for the family and for their child?
3. Do the school programs and educational backgrounds of students of rapid and slow cognitive development differ in
    a. Schools attended?
    b. Courses taken?
    c. Activities pursued?
    d. Grades made?
    e. School attendance?
    f. The teachers' perceptions of the student's attitudes toward school and education, achievement motivation, school behavior, self-esteem and self-perceptions, peer relations, and values and goals? (Mize & Klausmeier, 1977, p.3)

Tests, structured interviews with the students, their parents, and teachers, and examination of school records were employed to secure information regarding the preceding items. This information was evaluated and synthesized, first for each student, and then for the rapid and slow developers. The judgment as to whether a certain condition was or was not associated with rapid and slow development is presented in Table 1.1.

Eight of the 31 variables given in Table 1.1 were judged not to be useful for differentiating rapid and slow developers at either grade level. Fourteen were judged to differentiate between rapid and slow developers at both grades. Nine variables discriminated between

Table 1.1. Variables Associated with Rapid and Slow Cognitive Development[a]

Variables	Sixth Grade	Twelfth Grade
Self		
IQ Score	Yes	Yes
Self-Esteem	Yes	Yes
Internalized Responsibility for Learning	No	No
Attitudes toward School	Yes	Yes
Attitudes toward Curriculum	Yes	Yes
Achievement Motivation	Yes	Yes
Self-Directedness of Behavior	Yes	Yes
Peer Relations	No	Yes
Attitudes toward Parents-Home	No	Yes
School/education		
Absenteeism	Yes	Yes
Grades (A-F)	Yes	Yes
Curriculum (Courses Taken)	No	Yes
School Involvement-Activities	No	Yes
Extracurricular Activities:		
TV	No	Yes
Reading	Yes	Yes
Sports	No	No
Hobbies	Yes	Yes
School Structure[b]	No	No
Classroom Structure[b]	No	No
Home-School Interaction	No	Yes
Rapport with Teachers	No	Yes
Home/family		
Demographic:		
Socioeconomic Status of Parents	Yes	Yes
Marital Status of Parents	No	No
Number of Children in Family	No	No
Parental Attitudes toward School-Education	Yes	Yes
Parental Expectations for Child	Yes	Yes
Parental Involvement with Child	No	Yes
Parental Supervision-Control of Child	No	Yes
Intellectual Climate of Home	Yes	Yes
Child's Home Responsibilities	No	No
Parental Child-Rearing Attitudes	No	No

[a] Based on Mize and Klausmeier, 1977, p. 220.

[b] The rapid and slow developers in each grade group went to the same schools and also had their instruction in the same or similar classroom arrangements.

the two developmental extremes at grade 12, but not at grade 6. This difference between the students in grades 6 and 12 appeared to be interpretable as follows. The self-concept, school-education, and home-family variables differentially associated with rapid and slow cognitive development in grade 12 had become more stable and also more sharply differentiated than they were in grade 6. The grade 6 students were still developing cognitively and socially and some of their self-school-education, and home-family attitudes and behaviors were not yet crystallized and integrated. For example, grade 6 students whose school achievements were relatively low and whose rate of cognitive development was slow nevertheless demonstrated peer relationships, attitudes toward parents and home, involvement in school activities, rapport with teachers, and other variables shown in Table 1.1 similar to those of the rapid developers.

The contributions of the various variables to rapid and slow cognitive development of the grade 12 students may be summarized. The rapid developers have above-average IQ scores and good school achievement as represented by high grades. They have a low rate of school absenteeism and pursue an academic curriculum in high school. They enjoy reading and manifest strong achievement motivation, self-esteem, and positive attitudes toward school, education, and teachers. They actively engage in school activities and hold positive attitudes toward parents, family, and home, and their social skills with peers and adults are good. More often than not they come from upper-middle or middle-class homes characterized by a good intellectual climate. Their parents have completed high school and possibly some college, have high aspirations and expectations for their child, hold positive attitudes toward school and education, and are concerned and actively interested in their child's school, teachers, and curriculum.

Slow developers, in contrast, have average or below average IQ scores and make low grades in school. They have a high rate of school absenteeism and pursue nonacademic subjects in high school. They are not interested in reading but depend on television for information and sedentary recreation. They have low self-esteem, low motivation for learning, and negative attitudes toward school, education, and teachers. They do not engage in extracurricular school activities regularly. They have less positive attitudes toward family and home and have poor social skills and peer relations. Slow developers are more likely to come from a lower-middle-class home with an impoverished intellectual climate and parents who did not complete high school. The parents or guardians have low expectations for their child, show little involvement with the child, express negative attitudes toward school and education, and exhibit little understanding of or interest in their child's school, teachers, and curriculum.

It should be pointed out that the slow developers identified in this study in grade 12 undoubtedly represent the high end of the range of slow developers at the high school level. These seniors were all sufficiently successful to complete four years of high school and receive a diploma. Other students who dropped out of school before their senior year were not available for inclusion in the study.

Many of the conditions associated with slow development are probably preventable if changes can be made in the home and family situation, in the school curriculum and instruction of the child, and in the relations among teachers, parents, and the student. Moreover, conditions such as absenteeism, lack of interest in reading, low self-esteem, low achievement and negative attitudes toward school, teachers, and the curriculum must be changed if the student is to achieve reasonably well. Personalizing the instruction and advising of students and arranging a more suitable educational program for each student are two possible means of aiding the slow developer, as well as other students. These and other ideas derived from the longitudinal research, as well as from other research on individual differences, were taken into account in formulating the design for the improvement of secondary education.

A Conceptual Design for the Improvement of Secondary Education

Some of the prior recommendations, the preceding and other research on learning and individual differences, as well as research on instruction and adolescent development, were used by the first author in 1977 in formulating a design for the improvement of secondary education. At that time, calls were being heard for better discipline, more structure, and higher achievement in secondary schools than is implied in the preceding recommendations. Newmann and Behar (1982) report that this trend continued in later recommendations. The present design reflects the need to promote the intellectual development of the student.

After the design was reviewed by scholars and practitioners, doctoral studies were carried out at the middle school level (Klausmeier, 1978) and at the high school level (Maier, 1978) to validate the objectives as indicating desirable directions for improving secondary education. These studies indicated that teachers, counselors, and administrators across the nation believe that implementing the design would yield improvement of secondary schooling.

The design indicates 10 components of secondary schools, one for each major component of a functioning secondary school. For each component there is a comprehensive objective. The 10 comprehensive objectives indicate desirable directions for the improvement and renewal of secondary education. The enabling objectives for each comprehensive objective provide illustrative means of achieving the comprehensive objective.[1] The 10 comprehensive objectives and the enabling objectives for Component 1 of the design, Educational Programming for the Individual Student, follow.

Educational Programming for the Individual Student

Comprehensive Objective: (Part I)

An individual educational program of course work and other activities is arranged for each student each semester that satisfies the student's developmental needs and characteristics and that also meets district and state requirements.

Illustrative Enabling Objectives:

Each student's individual educational program which includes all courses and other activities:

1.1 Is planned each semester or year by the student and the student's advisor.

1.2 Takes into account the student's aptitudes for learning different subject matters, interests, motivation, learning styles, career goals, and other personal and social characteristics.

1.3 Provides for experiential learning, including work experience in the community, for students who will benefit from it.

1.4 Is monitored cooperatively by the student and the student's advisor throughout the semester.

1.5 Is changed as necessary during the semester to assure high quality education for the student.

Comprehensive Objective: (Part II)

An individual instructional program is arranged for the student in each course and other activity that is part of the student's total educational program that takes into account the student's aptitudes, interests, motivation, learning styles, career goals, and other personal and social characteristics.

Illustrative Enabling Objectives:

The instructional program of the student:

1.6 Is planned by the student and the teacher of the course at the beginning of the course.

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[1] The complete set of comprehensive and enabling objectives is given in Appendix A.

1.7 Includes course and unit objectives that are appropriate for the student in terms of the student's aptitude, entering achievement level, and career goals.

1.8 Provides an appropriate amount of time in class, during school hours, or outside school hours to suit the student's rate of achieving his/her objectives in the course.

1.9 Provides for appropriate individual attention by the teacher to take into account the student's motivation and other personal characteristics.

1.10 Provides for an appropriate amount of teacher-directed individual, pair, small-group, and large-group activity to take into account the student's need for independence and preferences for mode of instruction.

1.11 Provides for an appropriate amount of student-initiated individual, pair, small-group, and large-group activity to take into account the student's need for independence and preferences for mode of instruction.

1.12 Provides for appropriate use of printed materials, audio-visual materials, and direct experiencing to take into account the student's preferred modes of learning--visual, auditory, tactual, or kinesthetic.

Planning an appropriate educational program for each student and monitoring the student's progress requires a school person to have a conference at least three times per semester with each student. Accordingly, there must be many counselors in the school to meet with the students or each teacher must serve as an educational advisor to 15 to 25 students to plan their programs and to monitor and evaluate their progress.

Providing an appropriate instructional program for each student in each course requires both teacher-directed and student-initiated activities to be arranged to take into account the differing educational needs and characteristics of students. Similarly, individual, small-group, and whole-class activities must be matched to the individual student's learning capability for the particular subject matter, learning styles, and other characteristics. Neither all teacher-directed whole-class instruction nor all individual assignments and activities can possibly provide for the educational needs of all students.

Curricular Arrangements

The curriculum is structured to meet state and district requirements but it can be adapted by the school and individual teachers to take into account the differing educational needs of students.

Three sets of changing conditions point to the importance of a comprehensive but flexible curriculum. Local, state, and federal agencies are making ever-increasing demands and regulations related to career education, competency testing, minority students, female students, handicapped students, economically disadvantaged students, bilingual students, gifted students, and others. Adults' perceptions of the developmental needs and the rights and responsibilities of students are changing, and the students' own perceptions regarding these matters are evolving also. Knowledge in all subject fields continues to accrue rapidly. The school's curriculum attempts to take into account these and other societal conditions so that an excellent individual educational program can be arranged for each student.

Experiential Learning and Career Education

Career education is arranged for all students; experiential-learning activities and/or work experiences in the community are arranged for each student who can profit from them. (Senior high school students, more than middle school students, require work experience and participation in community activities.)

The demands on the school for an effective program of career awareness, exploration, and preparation and also for citizenship education are increasing. Career education necessarily includes work experience for some students.

Closely related to this, many career and other educational experiences can be provided away from the school site. Most of our local communities have many potential opportunities for work and other educative experiences in which adolescents may participate with adults and also with younger children. Furthermore, many students are able to travel and study anywhere in our entire nation as well as in foreign countries as part of their community learning activities.

Student Decision-Making Arrangements

Students progressively assume more responsibility for planning, implementing, and evaluating their programs and activities with a lesser amount of adult direction and control.

Boys and girls in the United States mature physically about two years earlier than did their grandparents who were born at the turn of the 20th century, the time at which the grade 7-9 junior high school was started to meet the unique needs of this age group. Although they are maturing faster, the age at which they become economically independent is delayed increasingly; and in recent decades there has been a great increase in juvenile delinquency, crippling accidents, violent crimes, alcoholism, and venereal disease among modern youth of middle school and high school age. Despite the conditions, we should not infer that students are incapable of governing themselves as individuals or in small groups. However, it is equally fallacious to assume that all of them will become socially conscious, self-governing citizens without wise guidance and without observing the traditions and codified regulations that are needed to govern our adult society. Rules and regulations and means of enforcing them, as well as a student bill of rights, are required.

Starting in the early school years, boys and girls should have many opportunities for working individually and in small groups in their classes. As they progress into middle school, they should assume increasing responsibility for making important decisions about their own education and other matters. The high school must provide them opportunities to share decision making and planning with other students and with adults as a means of preparing them for their adult familial and citizenship roles. Throughout this developmental progression, the students need wise guidance.

Evaluating Student Learning and Educational Programs

The individual student's progress toward attaining his/her course objectives, the student's instructional program in each course, the student's total educational program, and the school's total educational program are evaluated systematically and the results of the evaluation are used in improving the educative processes of the school.

Teachers use a variety of measurement tools and devices to assess their students' achievements effectively. Rarely, however, has the student's total educational program for a semester, a year, or for an entire level of schooling such as the senior high school been evaluated. One of the problems here is that the criteria have not been identified by which to evaluate the student's performances in various courses and other activities. Whether a student attains course objectives is not a sufficient criterion; the appropriateness of the program objectives and the instructional materials and activities for the student also must be evaluated.

In recent years, many designs have been formulated for evaluating educational programs for groups of students, particularly programs that are federally funded. Generally, the designs call for evaluation directly related to the program objectives. Although designs are available and federally funded programs are evaluated, local schools rarely take the initiative for evaluating their own programs. Yet, annual evaluation by the staff of the local school is essential for guiding its own improvement efforts. In recent years, many innovative schools that have not gathered evaluation information systematically have been forced to abandon some of their excellent programs.

Administrative Arrangements

The school's administrative arrangements provide for cooperative planning and shared decision making by the persons responsible for implementing the plans and decisions that are made, mainly administrators, counselors, teachers, and students.

Decision-making groups that include administrators, teachers, counselors, and, in some instances, students and parents are formed to enable persons to participate in formulating the programs and plans that they are responsible for carrying out. Areas of shared decision making include aims and philosophy, curriculum, instruction including its evaluation aspects, and student advisory arrangements. The primary outcome of these administrative arrangements is that students, teachers, and counselors work enthusiastically to implement programs and plans that they help formulate. Other outcomes include favorable student attitudes, community involvement and support, high staff morale, and high work satisfaction.

Organization for Instruction and Student Advising

The faculty and students are organized into groups so that an effective educational program is arranged for the individual student each semester and advising is personalized.

Organizing students and teachers into smaller units makes it possible to provide an excellent individual educational program for each student and to personalize and humanize the instructional and advising processes. A team of teachers having the same students for a considerable period of time during the day permits much flexibility in using time, materials, and space to arrange the best possible instruction for the students in the subject or subjects taught by the team of teachers. When each teacher of the academic team also serves as an advisor to some of the students, the teacher advisor is aware of the progress and problems that the advisees are experiencing in the classes of all the team members. Furthermore, close and continuing contact is established between the advisor and the parents of the advisee.

Home-School-Community Relations

Effective communication and cooperative educational efforts between the school and the community are carried out as part of a program of home-school-community relations.

We are all aware of the rapidly changing conditions in our neighborhoods and in family living. In general it may be more difficult now than before to initiate and maintain communications and other desired relationships with the local community, but it is also imperative to do so. As one example, high quality career education is impossible for many students except as they participate in community activities.

The traditional family of father, mother, and one to four children living in the same home may no longer be the prevalent family unit. The new patterns in family and home life will probably continue and the school will be called upon to provide more effective communication and interaction between the parent(s) or guardian(s) of students and their teachers. Parent(s) or guardian(s) should participate at least once each semester in educational planning with the student and the teacher advisor. In a corollary fashion, the teacher advisor should be able to meet with any parent or guardian to discuss the education of the student.

Internal and External Support Arrangements

The environment for learning and instruction in the school and for work and other educative experiences in the community is enriched through the intellectual, technical, and material support provided by school and school district groups, and by external agencies, such as the state education agency, intermediate agencies, teacher-education institutions, and professional associations.

Administrative and organizational arrangements in the school and school district of the kind outlined earlier in this section are necessary for creating a desirable learning environment throughout the school. These arrangements require internal support by the principal in arranging class schedules and work loads of groups of teachers so that they can meet together at regularly scheduled times during their working hours. Adequate spaces must be found for their meetings. Counselors, too, can support teachers in serving as educational advisors to students. Many other kinds of support in terms of providing assistance to teachers are required of the principal.

The role of the district office, the state education agency, teacher education institutions, and professional associations require reappraisal with respect to how they can contribute to an excellent learning and teaching environment in the schools. The educational talent exists in our schools and external educational agencies for creating and maintaining good secondary schools. The working relationships between local schools and the external agencies need redirection and improvement.

Continuing Research and Development

Student learning and personality development, instruction, advising, administrative arrangements, and other educational processes become better understood and are improved through continuous research and development conducted by school personnel and cooperating individuals and agencies.

One problem associated with educational research today is that many researchers use the students and the school faculty as objects of theoretical research in which they are interested rather than conducting cooperative research with the schools to identify and help solve critical problems that the cooperating schools are experiencing. A related unresolved problem is for researchers to get potentially useful results of educational research into forms that students and teachers can use. These continuing problems suggest that any major renewal and improvement effort will require the local school staff to develop a capability for carrying out its own research and also to participate in cooperative problem-solving research with external agencies that are interested in identifying and solving current problems with the local schools.

This 10-component design provided the conceptual framework for conducting the research and development reported in this monograph. Accordingly, the improvement strategies worked out with the schools for raising student achievement in English, mathematics, and reading involved (a) arranging an appropriate educational program of academic work and other educational activities for each student, (b) arranging an appropriate instructional program for each student enrolled in each academic course, and (c) annually setting goals to maintain or to raise the achievement of individual students and composite groups of students, such as all the students of a grade. These strategies are explained more fully in Chapter 2. Another feature of the project was for each school either to establish an educational improvement committee composed of the principal and representative teachers and counselors to plan its research and improvement activities or to assign these responsibilities to an existing committee. Changes related to other components of the design were also made in order to implement the improvement strategies.

CHAPTER 2

PURPOSES AND PROCEDURES

A conceptual design for the improvement of secondary education was presented in Chapter 1. This design provided the substantive framework for conducting the cooperative research with the participating schools. The design implies that each school is a unique social organization. Accordingly, no two schools have identical organization structures or carry out identical improvement processes although there may be much similarity among schools. This view regarding the unique nature of schools is reflected in the purposes and the procedures that follow.

Two other points should be made before considering the purposes and procedures. First, the goal of the project was for each school to develop a permanent improvement capability. This called for each school to use procedures during the project that it would continue after the project ended. Accordingly, the data gathered and the improvement activities varied among the schools. They were not prescribed by the project director.

Second, each school collected and analyzed data on student outcomes annually and used this information in planning its improvement activities. After the last data collection, the project analyzed the same data on student outcomes and other information that was supplied by each school. Thus, the schools and the project had different purposes for analyzing the data and, accordingly, used different techniques.

Participating Schools

Two middle schools, one junior high school, and two senior high schools participated in the research. These schools were part of a network of innovative secondary schools that were associated with the Wisconsin Center for Education Research. They were selected from the larger network population on the basis of being representative of small, medium, and large schools of rural, suburban, and urban communities.

The teachers and students of each school were already organized into small groups in 1976-77, and each school was trying to provide effective instruction in each of the academic subject fields. A complete description of each school as it was functioning in 1977-78, as well as an indication of the changes that were made each year thereafter, are provided in Chapters 3 through 7. There is one chapter for each of the five schools. Accordingly, only a brief sketch of each school is given here.

Steuben Middle School is an inner city school of Milwaukee, Wisconsin. About half of the student population is black and about half is white. Grade 6 was being phased out during the project and the grade 6 enrollment dropped from 92 in 1977-78 to 36 in 1980-81. The total enrollment in grades 7 and 8 was 751 in 1977-78 and 874 in 1980-81.

Webster Transitional School of Cedarburg, Wisconsin, is a suburban school with a predominantly white population. The student enrollment in grades 6, 7, and 8 was 761 in 1977-78 and 712 in 1980-81. About equal numbers of students were enrolled in each grade.

Carl Sandburg Junior High School of Mundelein, Illinois, has some of the properties of both a rural and a suburban school. Its student body is white. It has only grades 7 and 8. The enrollment in the two grades combined was 380 in 1977-78 and 322 in 1979-80. Data were not gathered in this school in 1980-81 because the school changed its achievement test battery that year.

Hood River Valley High School, Hood River, Oregon, has the characteristics of a rural, small-town school. A small percentage of its students are Oriental and the remainder are white. The total enrollment was 785 in 1977-78 and 607 in 1980-81.

Cedarburg High School of Cedarburg, Wisconsin, is a suburban school with a student body that is predominantly white. The total enrollment in grades 9, 10, 11, and 12 was 1,376 in 1977-78 and 1,214 in 1980-81.

An inner-city high school of Milwaukee was selected in 1976-77 as a sixth school. The research plan was to have two large city schools, one at each the middle school and high school level, two suburban schools, and two small-town, rural schools. The large city high school of Milwaukee opened in the fall of 1977-78 in a new building. However, its enrollment and teaching staff did not stabilize until two years later in 1979-80. Accordingly, no information on student outcomes could be collected during the first two years, and the decision was made not to include it in the present study. Despite the loss of this school, the conclusions drawn in Chapter 8 regarding the improvement strategies and the school-organization structures that facilitated the implementation of the strategies are considered as generalizable to the two levels of schooling and to the three kinds of settings.

Time Schedule

The project extended for six years. The main activities of the schools and the project follow:

1976-77: The project director formulated a conceptual design for the improvement and renewal of secondary education and, based on the design, completed plans for cooperative longitudinal improvement-oriented research with the five schools.

1977-78: The project director and the school staffs planned the research activities and the related improvement strategies. The schools collected baseline data on all the students enrolled in their schools.

1978-79: Each school summarized and analyzed the 1977-78 data; based on the results, each school planned and implemented minor improvement activities in the second semester of 1978-79; each school collected the second year data. The research team provided consultation and assistance regarding the analysis and interpretation of the data and regarding the planning and implementation of the related improvement activities.

1979-80: The cycle of activities of 1978-79 was repeated, except that major improvement activities were planned and implemented.

1980-81: The cycle of activities of 1979-80 was repeated, and the last data on student outcomes were collected by 5/81.

1981-82: The research team analyzed all data collected by the schools.

Purposes of the Research

This project included both development and research activities. The goal of the development was for each school to start or refine administration-organization arrangements and improvement strategies that would enable it to attain desired student outcomes. This is referred to as the development of the school's improvement capability.

The research had four main objectives, all related to the development of a school's improvement capability. One was for each school to maintain a satisfactory level of student achievement in selected areas from year to year and to raise an unsatisfactory level. This was the primary purpose of the schools. In all five schools, English, mathematics, and reading were selected as areas of improvement in accordance with the purposes for which the research was funded.

Information related to other areas of student performance was collected. However, the activities of the project and the schools were not directed systematically toward maintaining or raising student performances in these areas. The other areas included other subjects in two schools. In all five schools, information regarding student attitudes toward school was collected, and information regarding student self-concepts was obtained in one school. Attendance information was gathered in all five schools.

A second purpose of the research was to determine the extent to which each school could implement a research method and three comprehensive improvement strategies worked out by each school and the project director. Most of the planned improvement activities of each school were related to these improvement strategies.

A third purpose of the research was to relate the changes that occurred in student outcomes from year to year to the planned improvements that were made annually by each school staff, to planned changes that were not directed specifically toward the selected student outcomes, and to unanticipated events that occurred and that may have influenced the selected student outcomes. Based on these relationships, the effects of the improvement activities on student outcomes were inferred. To achieve this objective, each school reported its annual planned activities and the unanticipated events to the project as well as the information regarding student outcomes.

The fourth purpose was to generate urgently needed knowledge, first, regarding usable and effective improvement strategies and, second, regarding school-organization structures and processes at the secondary school level that facilitate the implementation of the improvement strategies. In this regard, a comprehensive search of the literature was conducted. It showed that, despite the many recommendations for improving secondary education, no project of this scope had been carried out in which schools had developed and implemented improvement strategies on a schoolwide basis and had then determined the effectiveness of the strategies. It should be noted that the improvement strategies employed by the schools, as well as the facilitative organization structures and processes, are based on the conceptual design that was described in Chapter 1.

In addition to the preceding purposes, the project had two other objectives. One was to ascertain how the quarters of each grade of each school in mental ability achieved. The schools used this information on an annual basis to ascertain whether their educational processes were equally effective with the students of all quarters in mental ability. Another objective was to determine the achievement patterns of the boys and the girls of each grade of each school. This information was used by the project to extend knowledge regarding sex differences in achievement from grades 7 through 12 and also sex differences in gains in achievement from grades 7 through 12.

It was hypothesized that implementing the improvement strategies would have two main effects on educational achievement in each school, provided there were not offsetting unanticipated events that produced a negative effect on the selected outcomes. The hypothesized effects were:

> The mean educational achievement of the students of the same grade of a later year would be as high as, or higher than, the mean of the students of the same grade of each earlier year, e.g., grade 7 of 1978-79 vs. grade 7 of 1977-78, the baseline year, taking into account differences between the students of the successive grades in mental ability.
>
> The mean educational achievement of each later longitudinal group of students that entered the first grade of the school and com-

pleted the last grade would be as high as, or higher than, the mean of the first longitudinal cohort.

No predictions were formulated with respect to student attitudes or attendance. However, student attitude and attendance were not expected to fall as a result of the improvement activities.

Research Method

The research method used in this project is now examined from the standpoint of how the participating schools proceeded annually in their collection, analysis, and use of the data on student outcomes and how the project proceeded in analyzing the data on each student at the end of the project. Only an overview is given of the research method. The detailed information regarding the tests used in each school are presented in Chapters 3 through 7.

Data Collection and Analysis by the Schools

The information on the students of each grade was gathered by each school at 12-month intervals for four years. Each school gathered information on all the students regarding educational achievement and attitudes. Each school also had a mental ability score for most of its students. The particular information that was gathered regarding achievement, mental ability, and attitudes was determined by each school. No two schools used identical tests and inventories. Rather, the particular tests and inventories already being used by the school in one or more grades were administered to the students of all grades.

The achievement and mental ability information for each grade for the first year, the baseline year, and for each successive year thereafter was summarized by each school in this manner. The mental ability score for the students of each grade was obtained. The students of each grade were divided into quarters based on their mental ability scores. The mean, or average, mental ability score of each quarter of each grade was computed. Then the mean mental ability score was changed to an equivalent percentile rank. Next, the educational achievement test score of each student in each subject was recorded. The mean achievement for each quarter was computed and converted to an equivalent percentile rank. These data for each grade were tabled annually by the school.

The tabled information was interpreted by each school staff. The results of this interpretation were used in assessing the effectiveness of the school and classroom processes of the current year and in planning improvements for groups of students for the ensuing year.

Percentile rank and mean were the only statistical terms used by the local school staffs in their analysis of the quantitative information. These terms were readily understood. It was also relatively easy for each staff to observe the extent to which the different quarters of the class in mental ability were achieving above or below their ability in any given subject. This information, when supported by teacher judgment, enabled the staff to decide if their curricular and instructional arrangements were equally effective for all four quarters of the class in mental ability. Inferences also were readily drawn as to whether achievement was higher or lower comparatively in the different subject fields. The school staff was able to use this information in setting goals in the various subject fields for quarters of the same class and for the entire class.

In addition to the preceding information, the school had (for most of the individual students) a mental ability score, an achievement profile, and other information. This enabled the school to identify the individual students who had achieved above or below ability in a subject and to arrange a more appropriate instructional program for the student. Special attention was given to students who were achieving considerably below ability in English, reading, or mathematics.

The project provided assistance to each school in formulating the preceding research method during a planning period and also later in implementing all aspects of it. More assistance was given to the schools in the first two years of the project than in the last two years.

Data Analysis by the Project

Each school provided its summary tables to the project each year. The project reviewed this information and made suggestions to the school regarding educational improvements to be made. Each school also provided test scores and other information for each student. The project used the individual student's scores in the final data analysis that was carried out after the last data collection by the schools in May of 1981. This information was analyzed in the following manner.

The mean, or average, achievement of the students of each grade each successive year in each subject field was compared with the mean achievement of the students of the same grade in preceding years, including the baseline year, 1977-78. This is called the cross-sectional analysis. For example, the achievements of four successive grade 7 classes of Steuben Middle School were compared to ascertain how the achievements of each later grade 7 class compared with the achievements of each earlier grade 7 class, and especially the baseline class of 1977-78. The statistical significance of the difference among the means was determined using analysis of covariance, with mental ability the covariate. Analysis of covariance was used in order to take into account differences among the successive classes in mental ability. When a difference significant at or beyond the .05 level was found among the grades, a post-hoc comparison was made of the difference between the means of each pair of grades. Differences significant at or beyond the .05 level between males and females were also determined in the cross-sectional analysis.

Some students of each school entered the first grade of the school in a particular year, took all the tests, and continued through the last grade of the school. This group of students is called a longitudinal cohort. The achievements of each longitudinal cohort were analyzed by repeated measures analysis of variance in order to ascertain the main effects pertaining to quarter in mental ability, sex, and gain in achievement. This enabled the project to ascertain whether the level of achievement and the gain in achievement were significantly different for the various quarters in mental ability and also for males or females. The achievements of two or more longitudinal cohorts of the same school were compared, using analysis of covariance with mental ability the covariate, in order to take into account the differences between the cohorts in mental ability. In this analysis, differences in the level of achievement and the gain in achievement between the cohorts and between the boys and girls were identified. Differences among the quarters in mental ability could not be determined since mental ability was used as the covariate. Post-hoc comparisons were made of differences that were found to be significant at or beyond the .05 level.

Each school provided information to the project regarding the planned improvements in English, mathematics, and reading that it made each year for groups of students, planned changes that were made each year but that were not focused on these three subject fields, and unanticipated events that occurred each year that may have influenced student achievement positively or negatively. The project director related these changes and events to the changes that occurred in student achievement from year to year. Each school reviewed the report of these relationships, as well as the complete report of the school's research and improvement activities, that appear in Chapters 3 through 7. Any discrepancies that were found were corrected by the research team, and mutual agreement was reached regarding the relationships that are reported in Chapters 3 through 7.

Nature of Inferences Drawn

Inferences were drawn as to whether the planned improvements and the nonfocused changes and unanticipated events that occurred each year had a positive effect, a negative effect, or no effect (neutral) on student achievement. Significantly higher mean achievement by the students of a later year who experienced planned improvements that the students of an earlier year did not experience was interpreted as a positive effect of the planned improvements. In cases where unanticipated events having a negative effect occurred during the same year as the planned improvements, it was recognized that the achievement might have been even higher. Significantly lower mean achievement by the students of a later class that experienced the planned improvements was treated as a negative effect. However, unanticipated events that had a negative effect that might have outweighed the effect of the planned improvements were identified. A nonsignificant difference between the mean achievement of a later class that experienced planned improvements and an earlier class that did not was treated as a neutral effect. Here the planned improvements did not produce the higher achievement, or else there were unanticipated events with negative effects equal to the positive effects of the planned improvements. A nonsignificant difference between a later class that experienced the same planned improvements as the immediately prior class was also treated as neutral. For example, the third grade 10 class of a school achieved significantly higher than either of the first two grade 10 classes. The fourth grade 10 class also achieved significantly higher than the first two classes but not significantly higher than the third class. This significantly higher mean achievement by the fourth grade 10 class compared with the first two classes was treated as a positive effect, while the nonsignificantly different mean achievement by the fourth grade 10 class compared with the third class was interpreted as neutral. In this regard, the achievement of the fourth grade 10 class should have been evaluated as a positive effect if the achievement of the third grade 10 class was already as high as could be expected. However, no criterion was established for determining when achievement reached this level.

An explanation is in order regarding the interpretation of the longitudinal data. The first longitudinal cohort of a school was regarded as the baseline cohort in the same manner as was the first cross-sectional grade. The later cohort experienced more planned improvements than each earlier cohort. Accordingly, the mean achievement of each later cohort, averaged across all grades, was expected to be higher than that of the baseline cohort. Even though the mean achievement of the later cohort was expected to be higher because it experienced more planned improvements, it was not possible to relate the specific improvements and other events of any one year or semester to the averaged mean achievement of two successive cohorts. To illustrate, the first grade 10-11-12 longitudinal cohort experienced a particular set of planned improvements and other changes when the students were in each grade. The students of the second cohort experienced similar planned improvements during two of their grades, but not necessarily the identical ones. Moreover, these improvements were carried out one year later for the second cohort. In addition, both cohorts for two of their years in school experienced the same unanticipated events and other schoolwide nonfocused planned changes. Thus, only if the mean of a later cohort exceeded that of an earlier cohort could any conclusion be drawn concerning the cumulative effects of all of the changes and events on each cohort's achievement.

A second consideration regarding the longitudinal cohorts is that the number of longitudinal students of each grade was considerably fewer than the number of cross-sectional students of each grade. This occurred because all the longitudinal students were included in the cross-sectional grades but many cross-sectional students were not part of a longitudinal cohort. Accordingly, the cross-sectional students are more representative of the entire student population of the school than are the longitudinal students. For this reason, as well as the difficulty in relating the planned improvements and other changes to the average achievement of the successive longitudinal cohorts, the results pertaining to the longitudinal cohorts are interpreted as being supportive or not supportive of the cross-sectional results.

Let us now consider the gains in achievement. No attempt was made to relate either the gains made by each cohort or the comparative gains made by the successive cohorts to the planned improvements and other events. As was indicated earlier, the effects of the planned improvements and the common unanticipated events experienced by two successive cohorts could not be sorted out reliably. Moreover, the students of the first longitudinal cohort had not experienced any planned improvements when tested the first time, but they had experienced some improvements when tested the next time. On the other hand, the students of a later cohort had already experienced planned improvements when tested the first time and then continued to experience planned improvements in the later grade or grades. Accordingly, the students of the first cohort were expected to gain as much or more than the second one from the first time of testing to a later time.

Although the gains made by the longitudinal groups were not related to the planned improvements and other changes, three important questions concerning gains were addressed. Did the students of each longitudinal cohort gain significantly from one time of testing to the next? Answering this question aided the schools in interpreting the effects of the total educative process, including the curriculum content of each grade. A second question was directed toward ascertaining whether the mean gains of the boys and the girls were alike or different. Here the purpose was to ascertain the total effects of the educative process on boys and girls, not to sort out the possible differential effects of the planned improvements on the achievements of the boys and the girls each year. No school deliberately carried out improvement activities that were directed more toward one sex than the other, and it was assumed that the combined effects of the planned improvements and other events would be the same for the boys and the girls. A final concern was whether the quarters in mental ability of each cohort gained equally. Here also the effects on the total educative process on each quarter, including the planned improvements and other changes, were of interest. Although cause-and-effect relationships were not inferred for sex and level of mental ability, the results regarding sex differences in gains in achievement in English, mathematics, and reading from grade 7 through grade 12 as well as the results for the four mental ability levels are of high interest in their own right. These results are summarized in Chapter 8.

It is appropriate to review the nature of the cause-and-effect inferences that were drawn, based on the cross-sectional analyses of the achievements of the successive grades. The research was carried out in vivo, not as a controlled experiment. Accordingly, there were no randomly-drawn sets of control groups of students in each school each year that did not experience the planned improvements, the nonfocused planned changes, and the unanticipated events. The closest approximation to sets of control groups of students were the students of each grade of each school in the first year of the study, the baseline year. These baseline-year students did not experience the planned improvements and the nonfocused planned changes and the unanticipated events that the later classes did. However, these are not randomly drawn control groups of students. Accordingly, the cause-and-effect inferences are more tentative than is the case in a controlled experiment in which only one independent variable is manipulated and all other variables are controlled. Taking this into account, the authors exercised much caution in their interpretations, and a considerable number of changes in student achievement from year to year, as well as nonsignificant differences, are reported as not being accounted for.

Before proceeding to the description of the improvement strategies employed in the schools, we may pause to consider how the massive amount of quantitative information was summarized and where it it reported. Tables were prepared that report descriptive information, including the mean score on each test and the standard deviation, for each total cross-sectional group and each total longitudinal group of students of each school, as well as for the boys, girls, and quarters in mental ability separately. Other tables were prepared that give the results of the tests of significance that were performed.

Summary tables were prepared, based on the preceding tables, that indicate whether a difference of interest, e.g., among four successive grade 7 classes in achievement, was or was not statistically significant at or beyond the .05 level. The summary tables also report the results of the post-hoc tests that were performed when a difference among three or more groups was significant. The relevant summary tables for each school are presented in Chapters 3 through 7 that follow.

Some other tables were prepared containing information that was not summarized in a chapter table but that is referred to in a chapter. All of the tables that report descriptive information and the tests of significance are reported in a publication of the Wisconsin Center for Education Research (Klausmeier, Serlin, & Zindler, 1982). These tables were put in the Center publication to make this monograph more readable and to reduce its cost. The list of tables appearing in the Center publication is given in Appendix B of this monograph.

Improvement Strategies

Three closely related strategies were worked out with the schools. These strategies involved use of the test data, as well as other information regarding the student, including teacher judgment. As we shall see later in Chapters 3 through 7, not all three strategies were fully implemented in all the schools. One strategy was to arrange an appropriate educational program of course work and other educational activities for the individual student each semester that satisfied the student's educational needs and that also met district and state requirements. The main concern here was to assure that the student had appropriate courses in which to enroll and enrolled in them. A second strategy was to arrange an appropriate instructional program for each student enrolled in each course, taking into account the student's aptitudes, achievements, career goals, learning styles, and other attributes. The third strategy involved raising the achievement of either the total group of students of each grade or part of the students of a grade, such as a particular quarter in mental ability.

Individual Educational Programming Strategy

The strategy for arranging an appropriate educational program for each student has three main steps:

1. In a conference with each continuing student and each incoming student and with the student's parents, develop an educational plan with the student for the forthcoming semester or year.

2. Implement the plan and monitor the student's progress related to each element of his or her program.

3. Evaluate the student's semester program in terms of the appropriateness and value of the program to the student.

As an example of this, in Hood River Valley High School, each student's entering grade 10 program was worked out when the student was in the junior high school in grade 9. The planning conference involved the student, a senior high school counselor, and the student's parents. In the conference, a major field of study and related grade 10 courses were identified by the student and the counselor. Upon enrollment in grade 10, a senior high school teacher advisor advised the student regarding the courses and monitored the student's progress.

Individual Instructional Programming Strategy

An appropriate instructional program must be arranged for each student in each course in order for the student to have an effective total educational program. The nature of the student's instructional program varies from one course to another depending upon the pattern of instruction followed in the particular courses. Four different patterns of instruction are possible and the school selects a particular pattern to follow in each course. The patterns are described briefly and then the model that was employed by the schools in planning and implementing each student's instructional program is outlined.

Patterns for arranging individual instructional programs. Each student's instructional program in any given course is related to whether or not all the learning outcomes of the course are required of all the students and whether or not the criterion for achieving the outcomes is mastery. Based on these two considerations, four patterns of instructional programs may be arranged for individual students in their various courses. The staff of each school participating in the research was already using one or more of these patterns in their courses in English, mathematics, and reading in 1977-78. More complete information regarding the patterns in the different schools is provided in Chapters 3 through 7 in the descriptions of the schools as of 1977-78.

1. Common outcomes, mastery criterion. In this pattern every individual student's program in a given course includes the same common outcomes as every other student's. Also, every student is

required to achieve the outcomes to a mastery criterion. Differences in the rates at which students master the units of the course or curricular area are taken into account in three ways. First, some students complete more units than other students during the same time period, such as a semester. Second, all students complete the same number of units during the semester, but they spend different amounts of time during the semester in completing the units. Third, all students complete the same number of units during the semester, but they engage in different amounts of in-depth and in-breadth enrichment activity. This pattern, with some students completing more units than others, was followed more than other patterns in all courses in English, mathematics, and reading at Hood River Valley High School.

2. Common outcomes, variable attainment. In this pattern every student's instructional program includes the same outcomes. However, the students attain the outcomes to a level of achievement judged by the teacher to be adequate for each student. Therefore, any student proceeds to the next unit of instruction in the sequence if the teacher judges the student's achievement to be adequate. Rapid learners may complete more units than slow learners during a given time period, but usually they complete the same number of units and engage in enrichment activities. Slower learners typically proceed through the units according to the same time schedule as other students, but master fewer outcomes. Some teachers at Steuben Middle School followed this pattern.

3. Variable outcomes, mastery criterion. When this pattern is followed, not all the students' instructional programs include the same set of required outcomes. Any given student's program may possibly have outcomes different from those of every other student. Typically, however, there is a core of required outcomes to be mastered by every student and there are also some variable or elective objectives suited to each student. The outcomes included in each student's program must be achieved to a predetermined mastery level. This pattern was implemented in the English and mathematics courses required for graduation at Cedarburg High School and in courses in English, mathematics, and reading at Carl Sandburg Junior High School and Webster Transitional School. Some teachers at Steuben Middle School also used it.

4. Variable outcomes, variable attainment. In this pattern, as in pattern 3, not all students' programs include the same outcomes and mastery of the unit outcomes is not required of any students. This pattern is followed when students are assigned responsibility for deciding what they will learn, when they will complete the work, and how well they will achieve. This pattern was employed in some elective courses in English and mathematics in grades 11 and 12 at Cedarburg High School.

The instructional programming process. A model for arranging an instructional program for the individual student has been formulated by Klausmeier (1977). Each school participating in the research was following this model to some extent in 1977-78 and to a greater extent each year thereafter.

1. Pre-assess each student's entering achievement level, learning styles, and motivational pattern. Assessing the entering achievement level of the students is necessary when first arranging instruction to take into account the readiness of each student to learn. It is not necessary after the students have completed a first unit of instruction, since the information from the preceding unit serves this purpose. Ordinarily, only achievement testing is done before instruction begins as part of the preassessment. Learning styles, motivation, and other characteristics of the students are identified from records, or by the teacher after instruction begins.

2. Set goals with each student based on the assessment. The goals that the student sets are based upon the course objectives. The objectives that the student has not yet achieved to a desired level are included in the student's goals and are used in developing the instructional plan of the student.

3. Plan and implement an instructional program in the course to enable the student to achieve the goals/objectives. This step applies when an attempt is made in the course to take into account the student's expected rate of achieving the objectives, learning styles, motivation, and other characteristics. The teacher proceeds differently with different students, as is indicated with a few examples. First, more time for learning is given to the slower than the faster students to achieve the same goal/objective. Second, a self-motivated student is given less teacher attention and direction than the unmotivated one. Third, students who do not learn from studying alone spend more time in pairs or in small groups interacting with other students. Fourth, the use of printed materials, audio-visual materials, and direct experiencing is varied to accommodate the different learning styles and interests of the students. Fifth, space and related equipment, such as the classroom, the instructional materials center, and the laboratory, are used differently for students in terms of their learning goals, interests, and conduct. Sixth, the amount of time spent by each student in teacher-directed individual, pair, small-group, and large-group activity is varied. Similarly, variations are made in terms of student-initiated activities. A combination of individual student activity, small-group activity, teacher-led small-group instruction, and teacher-led whole-class instruction appears to be necessary in most courses. Also, students require a considerable amount of teacher explanation, guidance, and monitoring when abstract concepts and principles are introduced.

4. Assess each student's learning progress and achievement of goals/objectives. This kind of assessment is essential for every unit and course. It is done during the course or unit to assure student progress in learning, and also at the end of each unit and course to determine students' achievement of their goals/objectives.

5. If the goals/objectives are achieved to the desired level, the student proceeds to the next unit. If the goals are not attained, the teacher determines why and takes other actions that are appropriate. This step is necessary only when the student must meet a specified criterion to move to the next unit or the next course. When the specified criterion is mastery, the actions that are taken with early achievers and late achievers depend upon the pattern of instructional programming that is being followed in the particular course and school, as described earlier in this chapter.

The preceding ideas regarding individual educational programs and related individual instructional programs may be clarified by examining the characteristics of two middle school students of Steuben Middle School and their instructional programs in English, mathematics, and reading. The same four academic courses in English, mathematics, reading, and social studies were completed by both students. They also had courses in physical education and the allied arts. The classes had an allocated time of 48 minutes per day, 5 days per week, for an 18-week semester. Information is provided regarding the content studied and the types of instructional strategies and kinds of materials that were used in three courses, namely, English, developmental reading, and mathematics. This detailed information regarding two students is provided to show how the teachers took into account the characteristics of the two students in arranging their individual instructional programs.

Brad's Characteristics

Brad is in grade 8 and is 14 years old. His percentile ranks on a recent standardized educational achievement test were 84 in reading, 86 in language, and 99 in mathematics. Brad is motivated by good grades and achieves at an above-average level in all of his classes.

Brad is proud of being a newspaper carrier, is interested in sports, and likes working with various types of electronic equipment. He maintains an awareness of current social, political, and economic problems. Brad plans to go to college after high school graduation but is uncertain about any particular career.

Related to learning styles, Brad can ignore most noises in the classrooms or labs when studying, prefers dim or shaded light, prefers to feel cool rather than warm, and studies best at a desk or sitting on a hard chair. He regards his classes as interesting and important. Brad finishes nearly all the things that he starts, thinks that it is important to do things as well as he can, and prefers classes where he selects most of the materials and activities and there are few directions. He learns best alone and likes to learn in several different ways rather than by any single method. Brad likes something to eat or drink when he studies, and he studies best in the afternoon. He likes to sit in the same place through most of the class period and likes to do things the way most other people do them.

Brad's Educational Program, 1st semester, grade 8.

Subject: English

Content Studied:

Composition: Emphasis on the development of thesis statements in composition.

Literature: Study of the novel for plot, theme, and character development.

Spelling improvement.

Creative dramatics: Write and produce an original play with a small group.

Proportion to nearest one-tenth in each instructional mode: individual .6, pair or small group .2, whole class .2.

Proportional use of instructional materials to nearest one-tenth: books .8, newspapers and magazines .1, films and filmstrips .1.

Alternative Activities in English:

Brad was assigned to the language arts/reading lab for 3 weeks instead of this English class. In the lab he studied Greek and Roman nature myths, with an emphasis on vocabulary, comprehension skills, and composition skills. The instructional modes were individual .4, pair or small group .3, and whole class .3. The use of instructional materials was books .4, films and filmstrips .2, records and cassettes .2, and teacher-prepared materials .2.

Subject: Developmental Reading

Content Studied:

Introduction to vocabulary skills with focus on content clues and word origins.

Development of comprehension skills with emphasis on main ideas, detail, inference, and conclusions.

Development of story understanding with emphasis on plot, character development, conflict, and climax as developed in short stories.

Instructional Mode Proportions: individual .5, pair or small group .5.

Instructional Materials Proportions: books .8, newspapers and magazines .2.

Alternative Reading Activities:

For 3 of the 18 weeks, Brad was assigned to the advanced reading lab instead of this developmental reading class. In the lab Brad focused on vocabulary improvement, including study of techniques to understand new words by using prefixes, suffixes, roots, context clues, and word origins. The instructional modes were individual .6, pair or small group .1, whole class .3. The instructional materials usage was books .3 and teacher-prepared materials .7.

Subject: Mathematics

Content Studied:

Brad work independently in two commercial math programs titled Key to Algebra and Key to Geometry. In algebra he completed basic concepts through the factoring of polynomials. In geometry he worked on definition of geometric shapes and procedures for construction of each shape.

Instructional Mode Proportions: individual .8, whole class .2.

Alternative Mathematics Activities:

Brad attended the math lab one day during each of the three six-week periods to participate in enrichment activities relating to algebra and geometry. In addition to this lab and the regular class Brad worked independently in math. On the locally-developed math competency test administered in September Brad scored 91%. A conference with the math lab teacher determined that the missed problems resulted mainly from calculation errors, not from a lack of concept understanding. The outcome of the conferences with the math lab teacher and unit math teacher was that Brad took programmed algebra and geometry courses which are used only by the highest level math students.

Lucy's Characteristics

Lucy is 13 years old and is in grade 8. On a standardized educational achievement test, she scored at the 34th percentile in reading, the 30th in language, and the 30th in mathematics. She has a moderately low level of conceptual development and low motivation to achieve in her academic subjects, but her motivation and achievement are high in both artistic and physical endeavors.

Lucy expresses her attitudes and opinions regarding films, clothing materials, and styles in a sophisticated, mature way. Her primary interests, as shown during the school day, in after-school activities, and outside of school are in artistic, gymnastic, and modern dance activities.

Lucy cannot study in a noisy environment. She prefers bright light for studying, warmth rather than coolness, and she studies best lounging in an informal arrangement. She regards academic classes as not very interesting or important but feels that art and physical education are great. Lucy voluntarily finishes only the things in which she is interested, thinks it is all right to do just enough to get by, and prefers classes where she is told exactly what to do. She learns academic subject matter best with a friend or two and prefers to learn visually, tactually, and kinesthetically. She likes something to nibble on when studying. She studies best in the morning and prefers to move around during the class period. Lucy prefers to do things her own way.

Lucy's Educational Program, 1st semester, grade 8.

Subject: English

Content Studied:

Composition techniques: Emphasis on development of basic sentence patterns and paragraph format.

Basic literature: Using mainly short stories, learn how characters are developed by the author.

Creative dramatics: Write and produce an original short play with a small group of students.

Instructional Mode Proportions: individual .1, pair or small group .7, whole class .2.

Instructional Materials Usage: books .5, newspapers and magazines .5.

Alternative activities: None.

Subject: Reading

Content Studied:

Vocabulary skills with emphasis on context clues.
Comprehension skills with emphasis on main idea and detail.
Short stories with focus on plot and characters.

Instructional Mode Proportions: individual .5, pair or small group .5.

Instructional Materials Usage: books .8, newspapers and magazines .2.

Alternative activities: None.

Subject: Mathematics

Content Studied:

Measurement: Use of ruler to nearest 1/16 inch.
Review of four basic mathematics functions with whole numbers.
Introduction to four basic functions using integers.
Use of tables in mathematics to solve problems.
Introduction to comparing, reducing, and factoring fractions.

Instructional Mode Proportions: individual .5, pair or small group .3, whole class .2.

Instructional Materials Usage: books .7, learning packages and commercial kits .3.

Alternative activities:

Spent one day during each three six-week period in the mathematics lab. Used manipulative materials to reinforce concepts from math class.

Goal-setting Strategy

Implementing individual educational programming and individual instructional programming effectively should lead to high student achievement and other favorable outcomes. However, these strategies alone do not yield satisfactory student outcomes under certain circumstances. For example, if the school does not offer appropriate courses, if appropriate materials are not available, or if an appropriate pattern of instruction cannot be implemented, desired outcomes may not occur. The goal-setting strategy was worked out to deal with conditions such as these and includes the following steps.

During a planning period, select the areas for improvement, the student groups to be involved, and the information gathering tools and procedures.

During the first year of implementing the strategy, gather, process, and summarize the information regarding each selected area of interest for each group of students.

Based upon the analysis of the first-year data, set goals in each subject and any other program area of interest for each continuing group of students and for each incoming group. Develop and implement plans for achieving the goals. (The setting of goals for an incoming group of students necessarily takes into account possible differences between it and the continuing group in aptitudes, entering achievement levels, or both.)

Gather, process, and summarize the second-year information, and use the results to assess the extent to which each group attained the goals set for it.

Assess the improvement activities and the curricular and instructional arrangements pertaining to the goals in terms of effectiveness, appropriateness, and value.

Continue the data gathering, goal setting, and improvement activities each year, making refinements in the improvement processes, curriculum, and instructional processes.

The first step of this strategy was completed with all the schools by the end of the first semester of 1977-78, and achievement test information was gathered on all the students in 1977-78. In Webster Transitional School and Cedarburg High School most of the achievement testing was done is September (Webster) or October (Cedarburg High School). The earliest summary information was available to the school staffs in September (Webster) and the latest in January (Cedarburg High School).

In the three schools that did spring testing--Steuben Middle School, Carl Sandburg Junior High School, and Hood River Valley High School--the first achievement test data were not summarized until the summer or early fall of 1978. In the first semester of 1978-79, teachers of these schools examined the summary tables. With this time schedule for data analysis and interpretation, only minor improvements could be planned and implemented in the second semester of 1978-79.

Goal setting and the related planning of improvements based on the summary data were not carried out systematically in any of the five schools until 1979-80. Thus, if this improvement strategy was effective in raising achievement and the other two strategies that were being partially or totally implemented were not, the achievements the classes of 1979-80 and 1980-81 were expected to be substantially higher than those of the earlier classes of 1977-78 and 1978-79.

The 1979-80 goals and the related improvement plans in reading, mathematics, and English for the grade 10 class of Hood River Valley High School illustrate how this strategy was carried out in this school. Notice that goals were set for each quarter of the grade 10 class in mental ability and that changes in the instructional arrangements and the curriculum were required to achieve the goals.

Curricular Area	Grade	Goal	Planned Changes
Reading	10	Each of the four quarters in mental ability will have a reading achievement percentile as high as, or higher than, the mental ability percentile of the quarter.	During 1979-80 one teacher from each of the nine subject areas will participate in a reading project with the staff from the Wisconsin R&D Center. The goal is to implement a schoolwide reading improvement program.
Math	10	Each of the four quarters in mental ability will	The school curriculum committee will recommend

Curricular Area	Grade	Goal	Planned Changes
		have a mathematics achievement percentile as high as, or higher than, the mental ability percentile of the quarter.	additional requirements in math, particularly for the top two quarters.
English	10	Each of the four quarters in mental ability will have an English achievement percentile as high as, or higher than, the mental ability percentile of the quarter. Since English is lower than math and reading for the past two years, a second goal will be to bring the English scores for all quarters up to a level comparable with math and reading.	A 10th grade English curriculum revision will require all 10th graders to participate in a five unit sequence of grammar review and composition.

Roles of the Project Staff

This cooperative research project was unique with respect to the continuing cooperation involved between the schools and the project over a period of six years. A brief summary of the role of each school and a more complete account of the role of the project staff follows to make clear the nature of the cooperative effort.

Many ideas regarding the research method and improvement strategies originated with the schools during the planning period and were synthesized by the project director. The principal and other members of each school staff worked with the project staff in adapting and implementing the research method. Each school assumed complete initiative and responsibility for planning and implementing its improvement activities.

Each school paid for its tests and the scoring of the tests. It also prepared the annual summary tables. The schools supplied the summary tables to the project annually.

Each school provided the information that was necessary to understand its programs and activities as of 1977-78, and each school reviewed the project's description of its school as it was functioning in 1977-78. Each school also provided an account of the planned changes and the unanticipated events that occurred each year after 1977-78. Each school reviewed the final report regarding its activities and results.

The role of the project staff was mainly consultative and facilitative. The project director (the first author of this monograph) was responsible for the direction of the project from the initial development of the research proposal in 1976-77 through the final proofing of this manuscript. No person other than the first author's secretary was with the project throughout this time interval. Moreover, the staff was not large at any time. The main responsibility of members of the research staff were as follows:

Herbert J. Klausmeier, professor, director of project, 15%, 1977-1982 (in addition, 50% released time from teaching supported by a chaired professorship).

John Daresh, project associate, 60%, assistance to the local schools in their annual data collection and data analysis, 6/78-12/80.

Louise Middendorf, graduate student and project assistant, assistance to the project director, 25%, 1/78-8/79.

Daniel Probst, graduate student and project assistant, assistance to the project associate and project director, 50%, 8/79-1/82.

Ronald Serlin, professor, supervision of final statistical analysis of data and review and editing of manuscript, 5%, 9/81-8/82.

Monica Zindler, graduate student and project assistant, 50%, data analysis, table preparation, and proofreading, 8/80-8/82.

Thomas S. Sipple, project specialist, hourly, preparing tables and proofreading, 3/82-3/83.

Secretarial staff equivalent to .8 FTE:

Arlene Knudsen	1/77-8/82
Janet Lindow	10/77-6/79
Julie Bixby	3/79-11/80
Donna Mlsna	2/81-8/82

In addition to the research activities, a staff development program consisting of printed materials, 10 filmstrips, and 9 school-experiences audiocassettes was developed and evaluated during the period 1978-79 through 1980-81 (Klausmeier, 1982). Other staff members not included in the prior listing were involved with the project director in developing these materials.

The size of the project research staff permitted only two to four site visits to be made to each school during 1977-78 and 1978-79 and one or two during the last two years. The site visits were used mainly to clarify aspects of the data collection, data analysis, data interpretation, data transmission, and the improvement strategies and the related improvement activities.

Two meetings of the principals and other staff members of the five schools were held in Madison during the first two years and one during each of the last two years to plan and assess progress. In addition, individual principals came to Madison occasionally. There were frequent telephone calls and a considerable amount of correspondence by mail.

With respect to the information on student outcomes, the project director recommended that measures be obtained annually related to English, mathematics, reading, and attitudes, and that attendance information be provided to the project. The project aided each school in tabling its information the first year and in interpreting the tabled information. The project director recommended arranging each class into quarters in mental ability, inasmuch as the schools were already securing mental ability scores on the students, and the correlation between mental ability and achievement in English, mathematics, and reading is high.

Related to the improvement strategies, the project director recommended to each school that it refine its 1977-78 procedures for arranging individual instructional programs for the students enrolled in each course by giving more consideration to individual student's mental ability and achievement test scores. Another suggestion was that the individual educational programming strategy should either be started or refined in the various schools and that the goal-setting strategy should be started in all the schools. Finally, each school was advised to change any of its organization structures and processes described earlier in Chapter 1, e.g., advising, evaluation, curriculum, as necessary to implement the preceding strategies.

CHAPTER 3

STEUBEN MIDDLE SCHOOL

Cooperative improvement-oriented research was carried out with Steuben Middle School during the years 1977-78 through 1980-81. The objectives of this research were indicated earlier in Chapter 2. The achievement areas selected for attention at Steuben were reading, language, spelling, and mathematics. Changes in student attitudes and self-concepts were also studied.

The administrative arrangement employed at Steuben to plan, monitor, and implement its research and improvement activities was an Instructional Improvement Committee formed in 1977-78. This included the principal, curriculum coordinator, and at least one teacher from each of its seven Instruction and Advisory Units. Resource personnel from the central office were called on as needed. All of the teachers of the academic subjects and the students were organized into Instructional and Advisory Units (I & A Units) consisting of four academic teachers and 120 students. Each team of four academic teachers had its students for a block of time each day and provided the instruction and most of the advising to the students during this time.

Let us now turn to the organization of the remainder of this chapter. Data regarding enrollment, staff, and attendance are provided for the four years, and Steuben is described as it was functioning in 1977-78. This is followed with an indication of the following that occurred each year: (a) nonfocused planned changes related to some aspect of the school's program that were not directed toward the student outcomes selected for improvement, (b) unplanned events that may have influenced the student outcomes, and (c) changes focused on the improvement of the selected student outcomes. Next, the changes in student achievement and other outcomes that occurred from year to year are presented and are related to the annual planned improvements, non-specific planned changes, and unanticipated events. Conclusions are reported in the last part of the chapter.

Staffing and Student Enrollment

Steuben Middle School is an integrated urban school located in Milwaukee, Wisconsin. The racial composition of the student enrollment from year to year is about 48% black, 10% Hispanic, 3% Native American, and 39% white. The socioeconomic level of the student population qualifies Steuben for ESEA Title I programs and services. The staff, administrators, and parents of Steuben students have worked together since 1973 to effect the transition of the school from a traditional junior high school to a middle school. (Steuben Middle School served as a model for the transition of 15 junior high schools of the Milwaukee Public Schools to middle schools in the period 1978-81. In the fall of 1980-81, 15 junior high schools became middle schools, making a total of 19 middle schools in Milwaukee.)

Information regarding the staffing of Steuben each year, the student enrollment as of September of each year, and the average daily attendance throughout each school year follows. The difference in average daily attendance from year to year is regarded as resulting mainly from differences in the amount of snowfall from year to year and the timing of official holidays and vacation breaks. A schoolwide effort was made in 1980-81 to increase attendance, as will be noted later in the discussion of planned changes.

	77-78	78-79	79-80	80-81
No. of building administrators	3	3	3	3
No. of counselors	2	2	2	2
No. of learning coordinators, curriculum specialists, etc., who teach little or not at all	1	1	1	1
No. of regularly certificated teachers[a]	50	50	52	51
No. of learning disability and special teachers of other exceptional children	5	5	5	5
No. of librarians or media persons	1	1	1	1
No. of school psychologists	.8	.8	.8	.8
No. of school social workers	1	1	1	1
No. of other certificated personnel	0	0	0	0
No. of aides[b]	18	18	20	14
No. of custodial and other non-certificated personnel not counting aides[c]	18	18	19	17

	77-78	78-79	79-80	80-81
Student Enrollment:				
Grade 6	92	88	73	36
Grade 7 and Grade 8	751	830	851	874
Percentage of average daily attendance	86	85	85	87

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[a] Includes unit, specialist, adjustment center, and Title I teachers.
[b] Number of hours worked per week ranged from 20 to 40 with an average of 33.
[c] Includes secretaries and part- and full-time custodial and food services personnel.

Data Gathered and Analysis of Data by the Steuben Staff

Data regarding student outcomes were gathered annually. These data were summarized and analyzed by the local school staff and used in determining areas of possible improvements for the ensuing year. After the last data collection in 1980-81, the same data on each individual student and on each group of students enrolled in each grade each year were analyzed by the project staff. The project analyzed the raw scores for both the achievement and mental ability tests. The data gathering instruments, the schedule of administration, and the techniques employed by the Steuben staff for analyzing the data are now outlined.

Metropolitan Achievement Test: 9 scores: Word knowledge, reading, reading total, language, spelling, math computation, math concepts, math problem solving, math total.

Administration: Grade 6, Grade 7, and Grade 8 in May of 1977-78, and same month of each successive year through 1980-81.

Analysis: Arrange the scores on each test from high to low for the students of each I & A Unit and for the total student body of Grade 7 and of Grade 8. Identify the 10th, 25th, 50th, 75th, and 90th percentile score (point) for each test and each group. Identify the same mental ability percentile scores for each grade and I & A Unit, using the Otis-Lennon Mental Ability Test scores from the district-wide testing done in Grade 5. Using the norm tables supplied by the test publisher, convert the obtained standardized achievement test score for each percentile score to a national percentile rank. Convert the obtained mental ability score for each percentile score to a national percentile rank. (Note that the students above any percentile score on any test, e.g., 75th on mental ability, may not be the ones who are above the 75th percentile on any achievement test.) Similarly, students who are above or below any given percentile rank on an achievement test may not be the same students above or below the same percentile rank on another achievement test.

Locally-constructed, 100-item objective-referenced mathematics test. Total test score.

Administration: Grade 6, Grade 7, and Grade 8 in September of 1978 and in May of 1979 and in the same months of each successive year through 1980-81.

Analysis: Identify scores for the same percentiles as for the Metropolitan Achievements tests and also the mean for Grade 7, Grade 8, and each I & A Unit.

Locally-constructed objective-referenced language test.*

Administration: To Grade 6, Grade 7, and Grade 8 starting in 1979-80.

Analysis: Identify scores for the same percentiles as for the Metropolitan Achievement tests and also the mean for Grade 7, Grade 8, and each I & A Unit.

Locally-constructed, objective-referenced reading test, starting in 1980-81.*

Administration: To Grade 6, Grade 7, and Grade 8 starting in 1979-80.

Analysis: Identify scores for the same percentiles as for the Metropolitan Achievement tests and also the mean for Grade 7, Grade 8, and each I & A Unit.

IOX: School Sentiment Index (Intermediate level): 7 scores--Teacher Mode of Instruction, Teacher Authority and Control, Teacher and Student Interpersonal Relationships, Learning, Social Structure and Climate, Peer, and General. IOX: Self Appraisal Inventory (Intermediate level): 4 scores--General self, Peer, Family, and Scholastic.

Administration: Annually to a sample of the Grade 6, Grade 7, and Grade 8 students of each I & A Unit, starting in the spring of 1979.

Analysis: Compute mean percent of favorable responses for each subtest for each Grade 6, Grade 7, and Grade 8 and for each I & A

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*These test results were used by the school but, in accordance with the cooperative research plan, were not provided to the researcher and are not presented in this monograph.

Unit. (This could not be related to mental ability percentile ranks since the students did not put their names on answer sheets.)

Information from school records.

Total enrollment in fall of each year and average daily attendance each year.

Improvement Strategies

Implemented by the Steuben Staff

The improvement strategies worked out by the researcher and the school involved use of the preceding data on student outcomes. These strategies were described in Chapter 2. One strategy was to arrange an appropriate educational program of courses and other educational activities for the individual student each semester. The second strategy was to arrange an appropriate instructional program for each student in each course. The third strategy involved setting goals and planning and carrying out related improvement activities either to maintain or to raise the educational achievement of the students of each quarter in mental ability of each I & A Unit.

The staff at Steuben School was not able to carry out individual educational programming systematically because of the relatively large number of students who entered and left the school each year. On the other hand, the staff was already implementing instructional programming for the individual student in 1977-78. Goal-setting in language and spelling was started by three I & A Units in 1979-80 and by all I & A Units in reading and mathematics. All I & A Units carried out goal setting in 1980-81 in these four areas.

We may now examine how Steuben used the test information gathered each year to select its improvement activities. Then we shall see how the information on individual students was used.

The standardized achievement test scores and the mental ability test scores were summarized annually as indicated earlier and summary tables were prepared and presented to appropriate groups of teachers. The conversion of the obtained scores to percentile ranks enabled the teachers to analyze and interpret the summary tables readily. (The information regarding the students of each I & A Unit was made available only to the I & A Unit staff.) Table 3.1 is the summary table that was prepared for the composite grade 7 class of 1977-78. (This table was made available to any interested teacher.)

Table 3.1 gives the local 10th, 25th, 50th, 75th, and 90th percentile ranks and the corresponding national student scores, grade equivalents, and percentile ranks in each area tested. The IQ score and equivalent percentile rank are also indicated. A summary table for grade 7 and another one for grade 8 enabled the principal and the

Table 3.1. Grade 7 Local Percentile Ranks and Their Corresponding National Standard Scores, National Grade Equivalents, and National Percentile Ranks Based on Metropolitan Achievement Test, Advanced, Administered 5/78, and Mental Ability and Related National Percentile Ranks Based on Otis-Lennon Mental Ability Test Administered to Students when in Grade 5: Steuben Middle School

Local %ile Rank		90			75			50			25			10	
	National			National			National			National			National		
	SS	GE	%ile	SS	GE	%ile	SS	GE	%ile	SS	GE	%ile	SS	GE	%ile
Word Knowledge	98	9.7	76	91	8.1	56	80	6.1	31	71	4.7	13	63	3.6	3
Reading	97	9.4	71	90	7.6	54	79	5.7	27	71	4.5	13	60	3.3	3
Reading Total	98	9.7	74	90	7.6	56	82	6.2	31	69	4.4	12	61	3.5	4
Language	98	9.7	65	92	7.8	47	83	5.9	26	75	4.7	13	69	3.9	6
Spelling	102	9.8	78	95	8.3	60	90	7.3	40	83	6.2	21	78	5.4	12
Math Computation	102	8.5	70	96	7.3	46	89	6.3	27	80	5.3	13	74	4.6	6
Math Concepts	98	8.9	77	90	7.3	52	81	5.6	25	75	4.8	13	72	4.4	7
Math Problem Solving	103	9.1	70	96	7.5	50	87	6.3	28	81	5.4	16	75	4.5	7
Math Total	106	8.6	73	98	7.3	48	90	6.0	26	85	5.3	13	77	4.4	6
		IQ	%		IQ	%		IQ	%		IQ	%		IQ	%
		115	82		104	59		93	33		86	19		79	10

relevant grade 7 and grade 8 teachers to make four assessments. (The principal and the teachers of the respective I & A Units had similar tables for their students and made the same assessments.) First, by noting the achievements of the students at the 25th, 50th, and 75th percentile ranks, they estimated how well their educational processes in each subject field were working for each quarter of each I & A Unit and each grade. (The 10th and 90th percentile ranks were noted, but it was recognized that the number of students above the 90th percentile rank and below the 10th percentile rank in each area tested was usually below 10 for each I & A Unit.) Second, they compared how each quarter of the students achieved across the nine areas tested. Third, they estimated how well the students of each I & A Unit of grade 7 and of grade 8 had achieved in the different areas that were tested. Fourth, they compared the percentile ranks in achievement with the percentile ranks in mental ability.

Based on these assessments, the principal, curriculum coordinator, and the staff of each I & A Unit developed plans either to raise or to maintain the achievement level of each quarter in the various subjects and also the mean achievement of the total I & A Unit or the total grade 7 or grade 8 class in one or more subjects. This step was implemented to a limited extent for the grade 7 and grade 8 classes during the second semester of 1978-79 and more completely in the last two years of the study.

We may now see how teachers used information regarding individual students.

Starting in the fall of 1978-79, the mental ability of each individual student, based on grade 5 testing and the percentile rank in each subject as shown on the computer printout of the May, 1977-78, achievement tests, was examined. This permitted the identification of students who were not only low in achievement in any area tested but also low in achievement in relation to ability. Students whose achievements were farthest below ability were selected for special attention. If the teacher or teachers concurred that the student was not achieving as well as expected, an expectancy of higher achievement was set for the student and activities to secure higher achievement were planned and implemented by the teachers.

It is noted that this activity focused on higher ability students who were achieving low in a subject field, rather than on the lowest-achievers in a subject field who were also low in mental ability. This activity was carried out with only a few students on a tryout basis in 1978-79 but with a substantial number in 1979-80 and 1980-81 in language, math, and reading.

Description of Steuben Middle School as of 1977-78

In the description that follows of Steuben Middle School as it was functioning in 1977-78, attention is given to the background and philosophy, administrative arrangements, organization for instruction and advising, pattern of curriculum and instruction, strategy for arranging each individual student's instructional program in each academic subject, community learning and career education, evaluation activities, program of home-school-community relations, internal and external support arrangements, and research activities.

Background and Philosophy

Steuben Middle School changed from a junior high school of grades 7, 8, and 9 in 1972 to a middle school of grades 7 and 8 during the 1974-75 school year. Grade 6 was added in 1975-76. However, the number of grade 6 students dropped from about 80 in 1977-78 to 30 in 1980-81. The number of students in grade 7 was about 30 to 50 higher than in grade 8 each year.

The school's philosophy is based on the concept that each student, regardless of age, is an individual with his or her unique intellectual, emotional, social, physical, and psychological needs. The school should provide a humanistic environment in which students reach their fullest potential in the cognitive, affective, and psychomotor areas. The middle school is viewed as an organization designed to meet the specific needs of pre- and early adolescent students. The middle school period is seen as one of transition from middle childhood and the elementary school environment to adolescence and the high school environment. To accomplish this transition successfully, the students are provided with an environment in which they continue to learn the essential skills and also explore many new areas of knowledge and skills.

Administrative Arrangements

At the building level Steuben features two major administrative groups. One is the administrative team. The second is the Instructional Improvement Committee.

The administrative team is composed of the principal and the two assistant principals. These three persons share the responsibility for student personnel services, scheduling, data processing, and together with the guidance counselors and faculty are responsible for student discipline. A curriculum coordinator, although not an administrator, assists the administrative staff and is responsible with the faculty for instruction throughout the school. This team met weekly during the 1977-78 school year.

The Instructional Improvement Committee of the school consists of the principal, the curriculum coordinator, a teacher representative from each of the seven academic I & A Units and from each of the three specialist units, the president of the Student Council, a teacher representative of the teachers' union, and a representative of the teacher aides. This group sets schoolwide objectives, determines school policies dealing with educational and administrative concerns, coordinates instructional activities involving two or more I & A Units, and reviews the overall school operations. This group met weekly during 1977-78.

Organization for Instruction and Advisement

The organization for instruction in the academic subjects is the academic Instruction and Advisory Unit (I & A Unit). Each academic I & A Unit consists of approximately 120 students, four teachers, and an aide. Students are assigned to I & A Units so as to be representative of the total school population according to sex, racial background, and academic ability. Teachers decide the I & A team in which they wish to serve.

In 1977-78 there were seven I & A Units. One unit included 80% 6th grade students (all the grade 6 students enrolled in the school) and 20% 7th grade students; two units had only 7th graders, two units had only 8th graders, and two units were composed of approximately 50% 7th grade students and 50% 8th grade students.

In addition to the seven academic I & A Units, there are two units comprised of specialist teachers who consult with the I & A Unit teachers and teach the allied arts to the students of the school, regardless of the academic Instruction and Advisory Unit membership of the students. The third unit consists of teachers of the children having exceptional education needs. They also consult with the teachers of the I & A Units and teach small groups of exceptional students.

Instruction is planned by the teachers in each I & A Unit working as a team. The teachers of each I & A Unit have a joint team planning period each day; in addition, each teacher also has an individual daily preparation period. The team planning period is devoted to matters dealing with instructional strategies, materials, student activities, etc. In addition, meetings may be held with the principal, curriculum coordinator, counselors, parents, or other resource personnel during the team planning period.

While there is no common planning time for the specialist teams, they are assigned a duty period and an individual preparation period, both of which are used by the individual teachers of these teams for gathering or producing materials, developing tests, etc.

The instructional day is organized into eight 43-minute class periods. Generally, students move from one class to another according to this fixed class schedule. However, the teachers of any I & A Unit have the option of not following the 43-minute time schedule so that activities which go beyond 43 minutes may be incorporated into their instructional plans.

The four staff members of each I & A Unit serve informally as advisors to the students of the respective units. Most of the advisement is carried out informally during the school day when the students are in class with the teacher or teachers. The advisors do not systematically use published materials regarding academic, personal, or social concerns of students or materials related to careers.

Pattern of Curriculum and Instruction

The curriculum includes the learning experiences of the students in courses, in extracurricular activities, and in educative experiences in the community that are coordinated by the school. In this section, courses, instructional materials, and extracurricular activities are described.

Courses. English, mathematics, and social studies are taken by all students in grades 6, 7, and 8. Reading is taken by all students in grade 6, all students in grade 7 except 60 of one I & A Unit who take science, and only those students in grade 8 who took science instead of reading in grade 7. A few students in grade 8 also participate in a Title I remedial reading program. All 6th and 7th graders take physical education, art, music, industrial arts, and home economics. Students in the 8th grade take physical education, career exploration, and health. Other courses may be taken by grade 8 students on an elective basis. Science is required of all 6th and 8th graders, but students in the seventh grade do not receive instruction in science.

All students receive daily instruction in English and mathematics during grades 6, 7, and 8. Science instruction for grade 8 occurs on a daily basis while students in grade 6 have science classes for one period every other day. Social studies is taught daily in grades 6, 7, and 8. Students in grades 6 and 7 receive instruction on alternate days in home economics, industrial arts, music, and art for one semester per year of each subject. Reading is taught daily to the students in grade 6 and to all 7th grade students with the exception of those enrolled in one of the I & A Units that has 7th and 8th grade students. Those 7th graders will take reading the next year.

All grade 6, 7, and 8 students attend an exploring class that meets during the last class period of each school day. During this period, each student elects six different sets of related activities for six-week periods of time throughout the 36 weeks of the school year. These activities may be extensions of other classes the student is taking or they may be of a type generally not included in the typical daily schedule. Among the activities offered in the exploring class are antique collecting, knitting, model building, foreign languages, cake decorating, drafting, dramatics, art, physical education, wood or metal crafts, body building, and instrumental or vocal music. The specific activities offered each year are a function of teacher or student interest.

A reading laboratory supplements the developmental reading program. All students of grade 6, those of grade 7 except 60 who took science, and the grade 8 students who did not have reading instruction in grade 7 receive objective-related, individualized instruction in the laboratory. Also some grade 8 students receive remedial instruction in the laboratory. The amount of instruction varies from as little as 43 minutes daily for 6 weeks for some students (grade 8) to as much as 43 minutes daily for 18 weeks for other students (grade 7). The primary purpose of the laboratory instruction is to aid students in developing word recognition skills, comprehension, and vocabulary. A published reading program is used in the laboratory. The laboratory is staffed by two teachers for grade 7 supported by one aide.

All students of grade 6, grade 7, and grade 8 receive mathematics instruction in a mathematics laboratory. The instruction may involve individual, pair, or small group activities. The two general objectives of this laboratory program are to provide enrichment activities that go beyond the regular mathematics instruction and to build student motivation for mathematics. Students spend a maximum of eight class periods per year in the math laboratory. The math laboratory is staffed by one full-time teacher.

Instructional materials. Instructional materials consist of a combination of commercially available items and materials developed by the Steuben teachers. An attempt is made either to purchase or develop materials that have the following characteristics:

clearly stated objectives;

pretests and other evaluation procedures to ascertain each student's level of achievement related to the objectives;

a variety of individual, small-group, and whole-class activities by which students may attain the same objectives;

posttests or other evaluation procedures to measure each student's achievement related to the objectives;

record-keeping forms and procedures; and

guidelines regarding the sequencing of instruction.

Most of the instructional materials used have either been purchased or developed within the last three to five years.

Extracurricular activities. The principal extracurricular activities are the Student Council and intramural athletics. The president of the Student Council is elected from the 8th grade each year, and members of the Student Council are elected by each of the seven academic I & A Units. The president represents the student body on the Instructional Improvement Committee.

The Student Council meets during the exploratory class period. Many traditional extracurricular activities are included in the exploratory class period.

Special Programs

In 1977-78 the average number of students throughout the year in the school's Title I program was 180. There were 40 in a program for mentally retarded children, 20 in a program for emotionally disturbed children, and 32 in a program for students with learning disabilities.

Arranging Each Student's Educational Program

Curriculum guides that include objectives and indicate the scope and sequence of instruction have been developed by the Milwaukee Public School District in the areas of mathematics, reading, writing, science, social studies, industrial arts, home economics, music, art, and physical education. The adaptation of these objectives to the student population of Steuben has been carried out systematically in mathematics, reading, writing, social studies, and home economics.

Placement tests keyed to the objectives are given to all students in reading and mathematics at the beginning of the school year and these results are used by the teachers in all I & A Units. In some I & A Units posttest results in reading and mathematics at the end of one instructional unit serve as a replacement for a pretest of the next unit.

Identifying instructional objectives for each student and carrying out related instruction is done in three of the seven I & A Units in most of the academic subjects. In the other four I & A Units these two steps are carried out only in reading and/or mathematics.

Postassessment is generally not related to students' mastery of objectives except in mathematics and reading. Posttests in other areas are used to determine the objectives that the students have attained, but students move on regardless of whether objectives are attained to mastery or some other criterion. The use of individual activities, pairing, tutoring, small-group work, and whole-class instruction varies somewhat from one I & A Unit to another and one curricular area to another.

Community Learning and Work Experiences

In 1977-78, classes went into the community for more than 160 activities, including fieldtrips. Museums, exhibits, and industries in the Milwaukee metropolitan area were visited throughout the year. Twenty-seven resource persons from the community visited classes. No students were employed for pay or worked to get career or work experience without pay.

Evaluation Activities

For placement purposes, the Nelson Reading Skills Test is administered in September to all students in grades 6, 7, and 8 receiving formal reading instruction. This test is given also in June as a posttest to ascertain each student's growth in reading during the year. A locally constructed mathematics test is used in the same way in grades 6, 7, and 8. In the reading laboratory, objective referenced tests are regularly used throughout each week of the school year to identify appropriate reading skills objectives for the individual students and to determine each student's mastery of the reading skills objectives. Some objective-based postassessment is done in varying degrees in some strands of other curricular areas of the school.

Most evaluation of student progress in the various academic subjects is carried out according to each teacher's schedule and varies for different subjects. Paper-and-pencil tests, teacher observations, performance tests, and work samples are used. All teachers attempt to make reliable estimates of each student's progress. These teacher judgments are used in record keeping and reporting.

The primary instrument used in the annual evaluation of the patterns of curriculum and instruction in the academic subjects is the Metropolitan Achievement Test. As part of the cooperative research, this test was administered to all students in grades 6, 7, and 8 in May, 1978. In prior years it was administered only to the grade 7 students as part of a city-wide testing program. The subtests in the areas of reading, mathematics, and language arts were administered.

Approximately 10 percent of the Steuben students in 1977-78 were administered two opinionnaires on a tryout basis related to affective development. One inventory was the Information Objectives Exchange (IOX) School Sentiment Index which included subscales regarding Teacher Mode of Instruction, Teacher Authority and Control, Teacher Interpersonal Relationships, Learning, Social Structure and Climate, Peer Relationships, and General Characteristics. The other instrument was the IOX Self-Appraisal Inventory which included four subscales in the areas of Self, Peer, Family, and Scholastic Attitudes. Both inventories were the intermediate levels and both were administered in the spring of 1978 to a sample of students drawn from all seven academic I & A Units.

Home-School-Community Relations

Teachers of each I & A Unit average three formal meetings with one or both parents of each student per year. The number of meetings varies with parent availability and also the procedures followed in the different I & A Units.

There is a Parent Advisory Committee. Members of this committee are elected from the school's Parent-Teacher-Student Association by the members of the Association. Each academic I & A Unit also has a parent representative on the Parent Advisory Committee. The Parent Advisory Committee meets with the principal every six to eight weeks.

Internal and External Support

Within the school, the staff of each I & A Unit spends at least one class period per day in a group session devoted mainly to matters dealing with curriculum, instruction, evaluation, and student concerns. In addition, a representative of each unit meets regularly with the Instructional Improvement Committee.

Released time was provided in 1977-78 by the Magnet School Funding of E.S.E.A., Title VII, for teachers to participate in magnet school activities. Substitute teachers were assigned on a continuing basis to facilitate the magnet school activities.

Curriculum consultants of the district office work with the staff on various activities, particularly in the areas of mathematics, reading, and writing. Research and evaluation personnel of the district office assist the staff in constructing objective-referenced tests in mathematics, reading, and writing. The standardized tests administered to the students are scored and the data are summarized by district personnel.

Continuing Research and Development

In cooperation with the Wisconsin Center for Education Research, a comprehensive program of cooperative educational improvement research was started in 1977-78 and continued through 1980-81.

Unplanned Events, Non-Specific Planned Changes, and Focused Planned Changes 1977-78 through 1980-81

Three kinds of changes follow in outline form for each year of the four years of the study: (a) non-specific planned changes related to some aspect of the school program that were not directed toward raising educational achievement in one of the nine areas tested, student attitudes, or student self-concepts, (b) unplanned events that in the judgment of the curriculum coordinator and/or principal might have influenced the student outcomes, and (c) changes focused on the improvement of student achievement, attitudes, or self-concepts.

1977-78

The data gathering instruments, the time schedule for gathering data, the data analysis procedures, and the improvement strategies were outlined. Procedures already in place in 1977-78 for identifying and providing for groups of students with exceptional needs as indicated in the 1977-78 description of the school were continued.

1978-79

Unplanned event

Student enrollment increased from 840 in September, 1977, to 918 in September, 1978. Nine new teachers replaced those who left and to take into account the higher enrollment. Some of the I & A Units were reorganized to take into account the higher enrollment.

Non-specific planned change

The school day was shortened for students by reducing the number of class periods from 8 to 7; however, there was an increase in the length of certain class periods of from 2 to 13 minutes, depending on curricular area and other factors. A homeroom period was established at the end of the school day and all teachers, including exceptional education teachers, were given a common preparation period after the students left the school.

Focused planned change

A school research committee was formed from the Instructional Improvement Committee to review and interpret the test results.

A new textbook series in grammar and composition was introduced throughout the district.

The reading laboratory was expanded to include other language arts. About 75% of all grade 7 and grade 8 students used the lab for an average of three weeks. The laboratory reading teacher was freed to spend about 10% of her total time assisting grade 8 teachers by offering instruction to groups of students either high or low in reading.

Computer-assisted instruction in reading and math was started in the second semester for Title I grade 6 and grade 7 students, about 8% of the total students of these grades.

The locally constructed math test was administered in September, 1978, to all grade 6, 7, and 8 students, and the results were used in planning instructional programs for the individual students. The test was administered again in May of 1979 to ascertain student progress and to plan improvements for the following year. The test was administered in September and May of the next years, and the results were used in the same manner.

1979-80

Unplanned event

A new assistant principal replaced one who left.

Non-focused planned change

A small cadre of Steuben staff members served as resource persons to the 15 junior high school staffs in their change-over to middle schools.

All learning disability and EMR teachers and students became a part of an I & A Unit. The amount of mainstreamed instruction for each student was determined by the unit teams and exceptional education teachers.

Focused planned change

The Title I Computer-Assisted Instruction Project, started second semester, 1978-79, was staffed by two teachers and one aide rather than one teacher and two aides so that more students could receive CAI instruction in reading and math.

A locally constructed, objective-referenced test in language was administered in September of 1979 and in May of 1980. The results of September were used to identify instructional needs of individual students and the results of May were used to ascertain student progress and to plan improvements in 1980-81.

Goal setting in language and spelling and related planning to achieve the goals were carried out for about one-third of the grade 7 and grade 8 students.

Additional out-of regular class reading instruction was provided for grade 6 and grade 7 students who scored above grade level on the Metropolitan test.

The computer-assisted reading and mathematics instruction was extended to include more Title I students and other low-achieving students, about 25% of the enrollment of grades 6, 7, and 8.

Goals were set in reading for the students of each I & A Unit and related instruction was carried out to achieve the goals. In general, each I & A Unit team set a goal calling for the mean percentile rank of its students in reading to come close to that of the mental ability percentile rank. Special attention was given to students whose reading achievement was considerably below their mental ability rank and to other low-achieving students.

A new math textbook series was introduced in all grades of the district.

Goals in math were set by all the I & A Unit teams and related plans were made and carried out.

1980-81

Unplanned events

Enrollment in grade 6 dropped from 73 to 36 while it increased from 851 to 874 in grades 7 and 8. Modifications were made in the staff and student composition of most I & A Units.

The positions of six instructional aides who worked with the I & A Units were eliminated with no provisions for replacements.

The mathematics laboratory and the reading/language arts laboratory were discontinued because of a reduction in teachers and aides.

Non-focused planned change

The school day for students was changed from 8:05-2:40 to 9:07-3:28 with the result that the teacher's individual planning period was changed from 2:40-3:28 to 8:00-8:54. This reduced the amount of after school assistance for students from teachers.

The positions of all department chairpersons were eliminated; the duties of the chairpersons were assumed by the curriculum coordinator.

Focused planned change

A locally constructed reading test was administered in September, 1980, and the results were used in the same manner as those for language in 1979-80.

A Title I grant provided 30 hours of inservice education for 25 teachers in techniques of teaching underachieving students.

The language strand of the Title I computer-assisted instruction was made available for use by Title I students; about 20% of Title I students were involved.

The Nelson standardized reading test was administered to all grade 7 students and about 60% of the grade 8 students. The results were used to plan reading instruction. Additional instruction was provided as an elective to about 15% of the grade 8 students advanced in reading.

Goals in math were set by all I & A Unit teams and related plans were made and carried out for the students of grades 6, 7, and 8.

Human relations education was provided to 100% of the students.

An absentee follow-up program planned by the district office involving phone calls, registered letters to parents, and parent conferences was introduced.

A school board policy enacted in the summer of 1980 required all grade 8 students below the 39th percentile in reading on the Metropolitan Achievement Test to be included in a reading improvement program.

None of the unplanned events and none of the non-focused planned changes given earlier were considered by the Steuben principal or curriculum coordinator to have contributed to higher student achievement. Possibly contributing to lower achievements were the following: the relatively high number of students entering and leaving the school during each school year, changes from year to year in the teaching staff, changes in the enrollment patterns from year to year and reorganization of the I & A Unit teams and students, changing the school day in 1980-81, and the loss of instructional aides in 1980-81.

Results Related to Educational Achievement

The results for four successive grade 7 and 8 classes are reported in this part of the chapter. The data for the grade 6 students were not analyzed because of their small number in relation to the grade 7 and grade 8 enrollments. Including the grade 6 students would have greatly reduced the size of the longitudinal groups. In the first part of this section descriptive information is given regarding the grade 7 and grade 8 students on whom mental ability scores were available and for whom there was standardized achievement test information for both years. The mental ability and the achievement test scores that were analyzed are raw scores. Second, identifying information regarding the standardized and locally constructed tests is presented. Third, a comparison is reported of the standardized-test achievement of the four grade 7 classes and the four grade 8 classes who attended the school each successive year and on whom mental ability scores were available. Results are also presented for the students who did not have mental ability scores and for other students who took the achievement tests in grade 8 but not in grade 7. Fourth, the results from the locally constructed math test are given. Fifth, the results pertaining to the achievements of three successive grade 7-grade 8 longitudinal cohorts are indicated. A longitudinal cohort consists of the students who took all the standardized achievement tests in both grade 7 and grade 8 and who had mental ability scores. Last, a comparison of the achievements of the three successive longitudinal groups is reported.

In this chapter much information is presented in summary tables. The original tables on which the summary tables are based, as well as other tables, are listed in the Appendix and are reported in Klausmeier, Serlin, and Zindler (1982).

Participating Students

Table 3.2 gives the total number of students, the number of boys and girls, and the mean raw mental ability scores for four successive grade 7 classes and four successive grade 8 classes of Steuben Middle School in 1977-78, 1978-79, 1979-80, and 1980-81. This is the total number of students on whom one or more test scores were available. The Ns for grade 7 ranged from 227 to 329 and for grade 8 from 231 to 273. The mean mental ability raw scores for the total grade 7 classes ranged from 39.57 (IQ=94) to 43.70 (IQ=96) and for the total grade 8 classes from 40.36 (IQ=94) to 43.56 (IQ=96). Similar variations in mental ability were found for the girls and for the boys from year to year. The information in Table 3.2 is presented for descriptive purposes and will not be discussed further.

Table 3.2. Total Number of Students of Four Successive Grade 7 and Four Successive Grade 8 Groups and Their Mean Mental Ability (Raw Score): Steuben Middle School

	1977-1978			1978-1979			1979-1980			1980-1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
Grade 7												
Total	227	42.83	15.48	329	39.57	14.92	293	40.54	13.83	307	43.70	13.53
Male	117	42.83	15.99	147	39.17	15.98	140	39.65	13.77	143	42.31	12.86
Female	110	42.84	15.00	182	39.90	14.03	153	41.36	13.88	164	44.91	14.01
Grade 8												
Total	236	41.83	15.28	242	43.56	15.01	273	40.36	15.07	231	41.49	13.89
Male	108	43.01	16.35	123	42.87	15.71	121	40.10	16.47	105	41.52	13.87
Female	128	40.84	14.31	119	44.27	14.28	152	40.56	13.91	126	41.46	13.95

Note: Raw scores and equivalent IQ scores and percentile ranks based on Grade 5 administration of the Otis-Lennon, Form J, 1967: 39=93 IQ, 32 percentile rank; 40=94 IQ, 34 percentile rank; 41=95 IQ, 36 percentile rank; 42=95 IQ, 37 percentile rank; 43=96 IQ, 39 percentile rank; 44=96 IQ, 41 percentile rank; 45=97 IQ, 43 percentile rank.

Information Gathered

The Metropolitan Achievement Tests, Form F, 1971, were administered to the grade 7 and the grade 8 students at one-year intervals in May 1978, May 1979, May 1980, and May 1981. The nine educational achievement test scores obtained annually were as follows: Word knowledge (reading), reading, reading total, language, spelling, math computation, math concepts, math problem solving, and math total. Note that there are three reading scores and four scores in mathematics.

The Otis-Lennon Mental Ability Test is administered annually to Grade 5 students in Milwaukee Public Schools. Form J, 1967, of this test was administered to the present students.

Comparison of Achievements of Four Successive Grade 7 Groups of Students Having Mental Ability Scores

For grade 7 the number of students taking any one of the achievement tests ranged from 219 to 227 (males 111-117, females 107-110) in 1977-78, from 320 to 327 (males 142-145, females 178-182) in 1978-79, from 288 to 291 (males 136-139, females 152-152) in 1979-80, and from 302-307 (males 140-143, females 162-164) in 1980-81.

As shown in the first column of Table 3.3, a significant difference was found among the adjusted means of the four successive grade 7 groups in each of nine achievement areas. The post-hoc comparisons related to these significant differences are given in the last six columns. Significant differences (Sign) as well as non-significant differences (NS) between the groups of each two years are shown. Footnotes 1 and 2 indicate whether the adjusted mean of the earlier or later grade 7 group was significantly higher.

The mean of the 1978-79 group was significantly higher than that of the 1977-78 group in language and math computation; lower in word knowledge, reading, and reading total; and neither higher nor lower in spelling, math concepts, math problem solving, and math total.

The grade 7 group of 1979-80 achieved significantly higher than the 1977-78 group in language and the four math areas and higher than the 1978-79 group in reading, reading total, math computation, and math concepts. The last grade 7 group, that of 1980-81, achieved significantly higher than the 1977-78 group in all areas except the three for reading, higher than the 1978-79 group in the three areas of reading, language, and three of the four math areas, and higher than the 1979-80 group in language. We should note in summary that the group of 1979-80 achieved significantly higher than one or both of the prior groups in seven of the nine areas while the group of 1980-81 achieved significantly higher than one or more of the prior groups in all nine areas. The second group, that of 1978-79, achieved lowest of all four groups in word knowledge, reading, and reading total.

Table 3.3. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement and Post-hoc Comparisons for Four Successive Grade 7 Groups with Mental Ability Scores: Steuben Middle School

	Group (G)	Sex (S)	G X S	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Word Knowledge	.014	.015[3]	NS	Sign[2]	NS	NS	NS	Sign[1]	NS
Reading	<.001	NS	NS	Sign[2]	NS	NS	Sign[1]	Sign[1]	NS
Reading Total	.001	NS	NS	Sign[2]	NS	NS	Sign[1]	Sign[1]	NS
Language	<.001	<.001[4]	NS	Sign[1]	Sign[1]	Sign[1]	NS	Sign[1]	Sign[1]
Spelling	.030	<.001[4]	NS	NS	NS	Sign[1]	NS	NS	NS
Math Computation	<.001	NS	NS	Sign[1]	Sign[1]	Sign[1]	Sign[1]	Sign[1]	NS
Math Concepts	<.001	NS	.018[5]	NS	Sign[1]	Sign[1]	Sign[1]	Sign[1]	NS
Math Problem Solving	.002	NS	.024[5]	NS	Sign[1]	Sign[1]	NS	NS	NS
Math Total	<.001	NS	.025[6]	NS	Sign[1]	Sign[1]	NS	Sign[1]	NS

[1] The mean of the group of the later year was significantly higher than the mean of the group of the earlier year.

[2] The mean of the group of the earlier year was significantly higher than the mean of the group of the later year.

[3] The mean achievement of the males was significantly higher than the mean of the females.

[4] The mean achievement of the females was significantly higher than the mean of the males.

[5] The mean achievement of the males of 1978-79 and 1980-81 was about the same while the mean achievement of the females of 1980-81 was higher than the mean achievement of the females of 1978-79.

[6] The mean achievement of the males and females of 1980-81 was higher than the mean achievement of 1978-79. However, this difference was greater for females than for males.

Table 3.3 shows three significant grade 7 group by sex interactions (G x S) involving math concepts, math problem solving, and math total. For math concepts and math problem solving the mean achievement for the males of 1978-79 and 1980-81 was about the same while the mean achievement of the females of 1980-81 was higher than the mean achievement of the 1978-79 females. For math total the mean achievement for both the males and females of 1980-81 was higher than the mean achievement of 1978-79. However, this difference was greater for females.

Three significant differences were found between the means of the grade 7 boys and girls. The mean achievement of the girls, averaged across the four grades, was significantly higher than the mean of the boys in language and spelling, while the boys' achievement was significantly higher than that of the girls in word knowledge.

Comparison of Achievements of Four Successive Grade 8 Groups of Students Having Mental Ability Scores

For grade 8 the number of students taking any one of the achievement tests ranged from 222 to 232 (males 101-107, females 121-126) in 1977-78, from 235-239 (males 116-122, females 117-119) in 1978-79, from 264 to 272 (males 116-121, females 146-151) in 1979-80, and from 223-227 (males 101-102, females 122-125) in 1980-81.

Table 3.4 shows that the differences among the four successive Grade 8 groups were significant for eight areas, including word knowledge and reading total but not reading. The post-hoc comparisons indicate that the grade 8 group of 1978-79 achieved significantly higher in spelling than the grade 8 group of 1977-78; however, in the other eight areas they did not achieve significantly higher or lower. The 1979-80 group achieved significantly higher than the 1977-78 group in spelling, math computation, math concepts, and math total and higher than the 1978-79 group in math computation. The 1980-81 grade 8 group achieved significantly higher than the grade 8 group of 1977-78 in all nine areas, higher than the 1978-79 group in word knowledge, language, math computation, math problem solving, and math total, and higher than the 1979-80 group in word knowledge and reading total. In summary, the

Table 3.4. Significant Differences (ANCOVA $p \le .05$) in Educational Achievement and Post-hoc Comparisons for Four Successive Grade 8 Groups with Mental Ability Scores: Steuben Middle School

	Group (G)	Sex (S)	G X S	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Word Knowledge	<.001	.003[2]	NS	NS	NS	Sign[1]	NS	Sign[1]	Sign[1]
Reading	NS	NS	NS						
Reading Total	.004	.012[2]	NS	NS	NS	Sign[1]	NS	NS	Sign[1]
Language	.002	<.001[3]	NS	NS	NS	Sign[1]	NS	Sign[1]	NS
Spelling	<.001	<.001[3]	NS	Sign[1]	Sign[1]	Sign[1]	NS	NS	NS
Math Computation	<.001	NS	NS	NS	Sign[1]	Sign[1]	Sign[1]	Sign[1]	NS
Math Concepts	<.001	NS	NS	NS	Sign[1]	Sign[1]	NS	NS	NS
Math Problem Solving	.004	.005[2]	NS	NS	NS	Sign[1]	NS	Sign[1]	NS
Math Total	<.001	NS	NS	NS	Sign[1]	Sign[1]	NS	Sign[1]	NS

[1] The mean of the group of the later year was significantly higher than the mean of the group of the earlier year.

[2] The mean achievement of the males was significantly higher than the mean of the females.

[3] The mean achievement of the females was significantly higher than the mean of the males.

1978-79 grade 8 group achieved significantly higher than the 1977-78 grade 8 group in spelling; the 1979-80 group achieved significantly higher than one or both of the prior groups in spelling and three math areas, and the 1980-81 group was significantly higher than one or more of the three prior groups in all areas except the reading subtest.

The mean of the boys, averaged across the four grade 8 groups, was significantly higher than the mean of the girls in word knowledge, reading total, and math problem solving, while the girls' mean was higher in language and spelling. There were no significant group by sex interactions. Accordingly, we conclude that the difference between the mean achievement of the boys and girls in all nine areas was consistent across the four successive grades.

Comparison of Achievements of Four Successive Grade 7 and Grade 8 Groups Without Mental Ability Scores

The number of grade 7 students without mental ability scores who took one or more tests ranged from 84 to 99 in 1977-78, 52 to 55 in 1978-79, 59 to 60 in 1979-80, and 64 to 67 in 1980-81. The number of grade 8 students without mental ability scores ranged from 67 to 71 in 1977-78, 50 to 52 in 1978-79, 72 to 81 in 1979-80, and 96 to 101 in 1980-81. These students were either absent on the day the mental ability test was administered in Grade 5 or they entered a Milwaukee school after grade 5.

The differences among the means for the four successive grade 7 groups of students without mental ability scores was significant in four of the nine achievement areas, namely language, math concepts, and math total. Six of the 24 post-hoc comparisons related to these four areas were statistically significant, and in each case the mean of a later group was significantly higher than the mean of a prior group. Thus, the direction of the significant differences for these four grade 7 groups without mental ability scores was the same as that for the grade 7 groups with mental ability scores; however, fewer differences were statistically significant.

The difference among the means for the four grade 8 groups without mental ability scores was significant only for math computation. The mean of the 1980-81 group was significantly higher than that of the 1977-78 group. The girls of both the four grade 7 and four grade 8 groups achieved significantly higher than the boys in language and spelling.

A simultaneous repeated measures analysis of variance was performed on the scores of the four grade 7 groups with mental ability scores and the four groups without mental ability scores, and also on the grade 8 groups. This analysis could not take into account possible differences in mental ability between the groups with and without mental ability scores. Accordingly, the results could not be compared directly with the results from the preceding analyses that were performed separately on the groups with and without mental ability scores. The highly important finding from this simultaneous analysis is that mean achievements of the grade 7 and grade 8 groups with mental ability scores were significantly higher than the means of the groups without mental ability scores in all nine achievement areas except spelling. Thus, the students who were either absent when the mental ability testing was done in grade 5 or who moved into the district after grade 5 achieved lower than those who were present in grade 5.

Achievement of Grade 8 Students Who Did Not Take Grade 7 Tests

We now turn to the grade 8 students without mental ability scores who were in Steuben in 1978-79, 1979-80, and 1980-81 but who were not in Steuben to take the Grade 7 tests. The number of these students taking the different tests ranged from 21 to 23 in 1978-79, 41 to 47 in 1979-80, and 64 to 69 in 1980-81. The achievements of these grade 8 students without mental ability scores were compared with the achievements of the grade 8 students without mental ability scores who were in Steuben for both the grade 7 and grade 8 testing. The number of students who were in Steuben for both test administrations was 29 for 1978-79, 31 to 34 for 1979-80, and 31 to 33 for 1980-81. Only in 1978-79 was a significant difference found between the two groups, namely in math problem solving. The mean of the students who took only the grade 8 tests was significantly lower.

The comparable numbers of students with mental ability scores who were present only for the grade 8 testing or for both the grade 7 and grade 8 testing were very small. Accordingly, no comparisons were made of the achievements of these groups.

Achievements of Three Successive Longitudinal Cohorts

Longitudinal Cohort 1 consisted of 191 students (97 males, 94 females) who entered grade 7 of Steuben Middle School in 1977-78, remained in the school through Grade 8 in 1978-79, took all of the achievement tests, and had mental ability scores from grade 5. Longitudinal Cohort 2 had 247 students (106 males, 141 females) who entered grade 7 one year later in 1978-79. Cohort 3 had 216 students (96 males and 120 females) who entered grade 7 in 1979-80.

Repeated measures analysis of variance (ANOVA) was used to ascertain the statistical significance of the differences among the means that were obtained for each longitudinal cohort. The same kind of analysis was performed on the scores of the students of the longitudinal cohorts of all the schools except Cedarburg High School, and the results were summarized and reported in the same kind of table for each school. Accordingly, a brief explanation follows to aid in the interpretation of the main effects and the interactions. (These are reported later in this part of the chapter in Tables 3.5a, b, and c for Steuben Middle School.)

The repeated measures ANOVA yielded the following kinds of significant differences (main effects): (a) among the mean achievements of the four quarters in mental ability, averaged across the two times of testing, (b) between the mean achievements of the boys and the girls, averaged across the four quarters in mental ability and the two times of testing (S in Table 3.5a), and (c) in the gain in achievement between the two times of testing for the total cohort (G in Table 3.5a). The difference among the four quarters in mental ability is not reported for Steuben in this chapter or for any other school in the later chapters since this difference was always significant at or beyond the .05 level.

The repeated measures ANOVA yielded two first-order interactions and one second-order interaction. The gain by sex interaction (G x S in Table 3.5a) indicates whether the boys gained significantly more or less than the girls from one time of testing to the next. The gain by quarter interaction (G x Q in Table 3.5a) indicates whether the difference in the gains among the four quarters between the two times of testing was statistically significant. The gain by sex by quarter interaction indicates whether there was a significantly different pattern of gains by the boys and the girls of the four different quarters between the two times of testing. A post-hoc test was performed when an effect involving three or more means was found to be significant. The results of the significant post-hoc comparisons are given in footnotes of the ANOVA tables.

Tables 3.5a, 3.5b, and 3.5c give the results of the tests of significance (ANOVA) for each successive cohort. The mean achievement of

Table 3.5a. Significant Differences (ANOVA $p \leq .05$) in Educational Achievement, Gain from Grade 7 to Grade 8, and Post-hoc Comparisons for Longitudinal Cohort 1: Steuben Middle School

	Sex(S)	Gain(G)	G X S	G X Q	G X S X Q
Word Knowledge	NS	<.001	NS	NS	NS
Reading	NS	<.001	NS	.001[3]	NS
Reading Total	NS	<.001	NS	.003[4]	NS
Language	.040[1]	<.001	NS	NS	NS
Spelling	NS	<.001	.034[2]	NS	NS
Math Computation	NS	<.001	NS	NS	NS
Math Concepts	NS	<.001	NS	NS	NS
Math Problem Solving	NS	<.001	NS	NS	NS
Math Total	NS	<.001	NS	NS	NS

[1] The mean achievement of the females was significantly higher than the mean of the males.

[2] The females gained more than the males from Grade 7 to Grade 8.

[3] The third quarter gained significantly more than the lowest quarter.

[4] The second and the third quarters gained significantly more than the lowest quarter.

Table 3.5b. Significant Differences (ANOVA $p \le .05$) in Educational Achievement, Gain from Grade 7 to Grade 8, and Post-hoc Comparisons for Longitudinal Cohort 2: Steuben Middle School

	Sex(S)	Gain(G)	G X S	G X Q	G X S X Q
Word Knowledge	NS	<.001	NS	NS	NS
Reading	NS	<.001	NS	.029[3]	NS
Reading Total	NS	<.001	NS	.005[4]	NS
Language	.053[1]	<.001	NS	NS	NS
Spelling	.026[1]	<.001	NS	NS	NS
Math Computation	NS	<.001	NS	NS	NS
Math Concepts	NS	<.001	.017[2]	NS	NS
Math Problem Solving	NS	<.001	NS	NS	NS
Math Total	NS	<.001	NS	NS	NS

[1] The mean achievement of the females was significantly higher than the mean of the males.

[2] The females gained more than the males from Grade 7 to Grade 8.

[3] The highest quarter gained significantly more than the lowest quarter.

[4] The third quarter and the highest quarter gained significantly more than the lowest quarter.

Table 3.5c. Significant Differences (ANOVA $p \le .05$) in Educational Achievement, Gain from Grade 7 to Grade 8, and Post-hoc Comparisons for Longitudinal Cohort 3: Steuben Middle School

	Sex(S)	Gain(G)	G X S	G X Q	G X S X Q
Word Knowledge	.026[1]	<.001	NS	NS	.004[2]
Reading	NS	<.001	NS	NS	NS
Reading Total	NS	<.001	NS	NS	.009[2]
Language	NS	<.001	NS	NS	NS
Spelling	NS	<.001	NS	NS	NS
Math Computation	NS	<.001	NS	NS	NS
Math Concepts	NS	<.001	NS	NS	NS
Math Problem Solving	NS	<.001	NS	NS	NS
Math Total	NS	<.001	NS	NS	NS

[1] The mean achievement of the males was significantly higher than the mean of the females.

[2] Quarter 2 males gained more than females while Quarter 3 females gained more than males.

the girls was significantly higher than the mean of the boys in language for Cohort 1 and in language and spelling for Cohort 2. The boys' achievement was significantly higher than the girls' in word knowledge for Cohort 3 but not for the other cohorts.

The students of all three cohorts made a significant gain in all nine achievement areas from grade 7 to grade 8. In each area, the mean of the same students when in grade 8 was significantly higher than when in grade 7.

We may now turn to the significant interactions for each cohort. Where a significant interaction involving gain by sex or gain by quarter was not found, we conclude that the boys and girls gained equally or that each quarter of the class in mental ability gained equally. For Cohort 1 the significant gain by sex interaction in spelling is accounted for by the fact that the girls gained more than the boys from grade 7 to grade 8. For Cohort 2 the significant gain by sex interaction in math concepts is related to the girls gaining more than the boys from grade 7 to grade 8. There was no significant gain by sex interaction for Cohort 3.

There were significant gain by quarter interactions for Cohorts 1 and 2 in reading and reading total. In both areas the lowest quarter gained less than a higher quarter from grade 7 to grade 8. For Cohort 3 there were no significant gain by quarter interactions; however, there were two significant gain by sex by quarter interactions. The boys of the second lowest quarter gained more than the girls, whereas the girls of the third higher quarter gained more than the boys.

Comparison of the Achievements and the Gains of Three Longitudinal Cohorts

Analysis of covariance, with mental ability the covariate, was used in identifying the significance of the main effects of cohort, sex, and gain of the three successive longitudinal cohorts. The main effect for cohort is based on the achievement of the students of the three cohorts averaged across both times of testing, not on the gain from one time of testing to the next. The effect for sex is based on the achievements of the boys and girls of the three cohorts combined and averaged for the two times of testing, not on gain in achievement from grade 7 to grade 8. The main effect of gain is for the gain between the two times of testing for the students of all three cohorts combined.

Table 3.6 gives the results of the tests of significance. The mean achievement of the males of the three cohorts combined was significantly higher than that of the females in word knowledge, reading total, math concepts, math problem solving, and math total. The girls' mean achievement was significantly higher than the boys' in language and spelling. There were no significant sex by cohort interactions.

Table 3.6. Significant Differences (ANCOVA $p \le .05$) in Educational Achievement, Gain from Grade 7 to Grade 8, Interactions, and Post-hoc Comparisons for Three Longitudinal Cohorts: Steuben Middle School

	Cohort(C)	Sex(S)	S X C	Gain(G)	G X S	G X C	G X C X S
Word Knowledge	$<.001$	$<.001^{1}$	NS	$<.001$	NS	.006	NS
Reading	.020	NS	NS	$<.001$	NS	.003	NS
Reading Total	.001	$.008^{1}$	NS	$<.001$	NS	.007	NS
Language	.009	$.014^{2}$	NS	$<.001$	NS	.002	NS
Spelling	NS	$.001^{2}$	NS	$<.001$	NS	.001	.011
Math Computation	$<.001$	NS	NS	$<.001$	NS	$<.001$	NS
Math Concepts	$<.001$	$.035^{1}$	NS	$<.001$	NS	$<.001$	.040
Math Problem Solving	.003	$.001^{1}$	NS	$<.001$	NS	NS	NS
Math Total	$<.001$	$.035^{1}$	NS	$<.001$	NS	$<.001$	NS

Post-hoc Cohort Main Effect

	Mean Achievement Cohort 1 vs Cohort 2	Mean Achievement Cohort 1 vs Cohort 3	Mean Achievement Cohort 2 vs Cohort 3
Word Knowledge	Sign^{4}	NS	Sign^{3}
Reading	Sign^{4}	NS	Sign^{3}
Reading Total	Sign^{4}	NS	Sign^{3}
Language	Sign^{3}	Sign^{3}	NS
Math Computation	Sign^{3}	Sign^{3}	Sign^{3}
Math Concepts	Sign^{3}	Sign^{3}	Sign^{3}
Math Problem Solving	NS	Sign^{3}	Sign^{3}
Math Total	Sign^{3}	Sign^{3}	Sign^{3}

Post-hoc Gain by Cohort Interaction

	Gain Cohort 1 vs Cohort 2	Gain Cohort 1 vs Cohort 3	Gain Cohort 2 vs Cohort 3
Word Knowledge	NS	Sign^{5}	NS
Reading	Sign^{5}	NS	NS
Reading Total	Sign^{5}	Sign^{5}	NS
Language	Sign^{6}	Sign^{6}	NS
Spelling	NS	NS	Sign^{5}
Math Computation	Sign^{6}	Sign^{6}	Sign^{6}
Math Concepts	NS	Sign^{6}	Sign^{6}
Math Total	Sign^{6}	Sign^{6}	Sign^{6}

Post-hoc Gain by Cohort by Sex Interaction

	Gain Males vs Females Cohort 1 vs Cohort 2	Gain Males vs Females Cohort 1 vs Cohort 3	Gain Males vs Females Cohort 2 vs Cohort 3
Spelling	NS	Sign^{7}	NS
Math Concepts	Sign^{8}	NS	NS

[1] The mean achievement of the males was significantly higher than the mean of the females.

[2] The mean achievement of the females was significantly higher than the means of the males.

[3] The mean achievement of the later cohort was significantly higher than the mean of the prior cohort.

[4] The mean achievement of the prior cohort was significantly higher than the mean of the later cohort.

[5] The later cohort gained significantly more than the prior cohort.

[6] The prior cohort gained significantly more than the later cohort.

[7] Cohort 1: The males gained more than the females.
Cohort 3: The females gained more than the males.

[8] Cohort 1: The males gained more than the females.
Cohort 2: The females gained more than the males.

The difference in the mean achievement of the three cohorts was significant in all areas except spelling. The post-hoc comparisons indicate that the achievement of Cohort 2 was significantly higher than that of Cohort 1 in language, math computation, math concepts, and math total; whereas it was lower than that of Cohort 1 in word knowledge, reading, and reading total. The mean achievement of Cohort 3 was significantly higher than that of Cohort 1 in language and the four math areas. The mean achievement of Cohort 3 was significantly higher than that of Cohort 2 in all areas except language and spelling.

As would be expected, the students of the three cohorts combined gained significantly from grade 7 to grade 8 in all nine areas. Turning to the significant gain by cohort interactions, we find that Cohort 2 gained significantly more than Cohort 1 in reading and reading total and that Cohort 3 gained significantly more than Cohort 1 in word knowledge and reading total, and also more than Cohort 2 in spelling. Cohort 1 gained significantly more than both Cohorts 2 and 3 in language, math computation, and math total, and more than Cohort 3 in math concepts. Cohort 2 gained significantly more than Cohort 3 in math computation, math concepts, and math total. We should be aware that a cohort scoring slightly lower in grade 7 and slightly higher in grade 8 in comparison with one scoring slightly higher in grade 7 and lower in grade 8 results in the prior cohort having the significantly higher gain. It will be recalled from the earlier results related to the successive grade 7 and successive grade 8 classes that the grade 7 classes of the last two years tended to score higher than the grade 7 classes of the first two years. Accordingly, there was a greater possibility for the earlier cohort to show a larger gain.

There were gain by cohort by sex interactions related to spelling and math concepts. The Cohort 1 males gained more than the females in spelling, whereas the Cohort 3 females gained more than the males. Related to math concepts, the Cohort 1 males gained more than the females, while the Cohort 2 females gained more than [illegible] males.

Grade 8 of 1977-78 was not part of any longitudinal cohort nor was grade 7 of 1980-81. The mean mental ability and the mean educational achievement of these groups are presented in tables of the Wisconsin Center publication (Klausmeier, Serlin, & Zindler, 1982). They are not discussed further but have been included to enable the interested reader to compare these grade groups with those included in the longitudinal cohorts.

Comparison of Mathematics Achievement Based on a Locally Constructed, Objective-Referenced Test

A set of 100 objectives was developed by the Steuben math faculty with consultation from the school district math coordinator. These objectives reflected a range of content such that the least mathematically able grade 6 students should be able to learn and master the easiest objectives and the most mathematically able grade 8 students should be challenged by the most difficult objectives. Accordingly, not many students were expected to master all the objectives upon completion of grade 8.

The staff constructed a 100-item test, one item for each instructional objective. The test was administered to all grade 7 and grade 8 students in September and May of each school year, starting in September of 1979. The September results were used by the I & A Unit teams to diagnose individual student's instructional needs and to set goals for individual students and for the composite student body of the I & A Unit. The May results were used by the I & A Unit team to assess the progress of individual students.

Table 3.7 gives the results of the testing for the three successive grade 7 and grade 8 classes. The gains from September to May of each school year are based on the test results of the same students. We observe that each later grade 7 class made a larger gain from September to May, 14.3, 19.6, and 21.4, whereas the gain of the second grade 8 class (14.9) was considerably higher than for the first class (11.6) and also slightly higher than the third class (13.7). Moreover, the grade 7 classes gained consistently more than the grade 8 classes across all three school years; and, in May of 1981, the mean of the grade 7 class (60.6) was higher than that of the grade 8 class (60.0).

We observe that the means of the grade 7 classes in May were higher than the means of the grade 8 classes in the following September. We should recognize that a considerable number of grade 8 students who took the test in September were new to Steuben and did not take the test in May as grade 7 students. Furthermore, a considerable number of grade 7 students did not continue into grade 8 at Steuben. Accordingly, the difference between the May test results for grade 7 and the September tests for grade 8 should not be interpreted as reflecting a loss by the Steuben students during the summer months.

Table 3.7. Mean Achievement of Three Successive Grade 7 and Grade 8 Groups on A Locally Constructed, Objective-Referenced Mathematics Test: Steuben Middle School

	Sept. 1978	May 1979		Sept. 1979	May 1980		Sept. 1980	May 1981	
	$\bar{X}$	$\bar{X}$	Gain	$\bar{X}$	$\bar{X}$	Gain	$\bar{X}$	$\bar{X}$	Gain
Grade 7	37.0	51.3	14.3	37.0	56.6	19.6	39.2	60.6	21.4
Grade 8	47.2	58.8	11.6	45.1	60.0	14.9	46.3	60.0	13.7
Difference	10.2	7.5		8.1	3.4		7.1	0.6	

We may recall that the mean math achievements based on the Metropolitan Achievement Test were consistently higher for the grade 7 and grade 8 groups of 1979-80 and 1980-81 than for the groups of 1977-78 and 1978-79. The results from this locally constructed math test support those based on the Metropolitan.

Relationship of Changes in Educational Achievement to Implementation of Improvement Strategies and Unanticipated Events

A main purpose of this cooperative research was to relate the changes in student achievement from year to year to the planned changes that the staff made annually in classroom and school processes and structures in order to implement the improvement strategies. As was explained in Chapter 2, the primary information regarding the changes in student achievement from year to year is based on the comparison of the achievements of each later grade 7 and grade 8 group with the grade 7 and grade 8 achievements of each earlier group. A secondary basis is the comparison of the mean achievement, averaged across both years, of each later longitudinal cohort with each earlier cohort.

The findings presented earlier in this chapter pertaining to reading total, language, spelling, and math total are used in relating the changes in student achievement to the planned improvements and the unanticipated events. Reading total and math total are used rather than the subtests in these areas, since the planned changes given earlier in this chapter were not directed to the specific areas of reading and math measured by the subtests. The findings presented earlier in the chapter regarding (a) students without mental ability scores and (b) the grade 8 students who were not in Steuben for the grade 7 testing are not discussed in this section of the chapter inasmuch as the planned changes were made on the basis of the annual results for students with mental ability scores.

Table 3.8 provides a summary of the findings pertaining to the educational achievements of the four successive grade 7 and grade 8 groups with mental ability scores. The significant differences and nonsignificant differences are indicated as well as the equivalent percentile ranks for each achievement area. The percentile ranks equivalent to the adjusted means are provided to aid the interpretation of the amount of change from year to year.

The comparisons of the achievements of the 1978-79 grade 7 and grade 8 groups with those of 1977-78 are regarded as unrelated to the planned improvements since only minor improvements were carried out in the second semester of 1978-79. A significantly higher mean for a grade 7 or grade 8 group of either of the last two years in comparison with an earlier year is regarded as a positive effect and a nonsignificant difference is regarded as neutral. A significantly lower mean is regarded as a negative effect, except if the effects of unantici-

Table 3.8. Summary of Findings Regarding Mean Achievement of Four Successive Grade 7 and Grade 8 Groups and Percentile Ranks Corresponding to Adjusted Achievement Means: Steuben Middle School

	Comparisons of Successive Groups					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Grade 7						
Reading Total	S-	NS	NS	S+	S+	NS
Language	S+	S+	S+	NS	S+	S+
Spelling	NS	NS	S+	NS	NS	NS
Math Total	NS	S+	S+	NS	S+	NS
Grade 8						
Reading Total	NS	NS	S+	NS	NS	S+
Language	NS	NS	S+	NS	S+	NS
Spelling	S+	S+	S+	NS	NS	NS
Math Total	NS	S+	S+	NS	S+	NS

	Adjusted Means and Equivalent Percentile Ranks							
	1977-78		1978-79		1979-80		1980-81	
	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 7								
Reading Total	43.44	34	39.92	29	42.66	34	43.11	34
Language	38.21	30	41.17	32	42.09	36	45.27	42
Spelling	26.17	40	27.31	44	26.74	44	27.69	48
Math Total	50.75	30	54.95	36	60.14	44	60.06	44
Average Student N	223		323		289		304	
Grade 8								
Reading Total	48.98	30	50.03	32	48.28	28	52.46	35
Language	44.66	30	45.37	30	46.77	32	48.08	34
Spelling	27.64	32	29.25	36	29.74	38	30.57	39
Math Total	60.45	32	62.53	34	65.43	36	68.38	42
Average Student N	228		237		267		224	

S+ The mean of the group of the later year was significantly higher than the mean of the group of the earlier year.

S- The mean of the group of the later year was significantly lower than the mean of the group of the earlier year.

pated events were judged to have outweighed the effects of the planned improvements.

The mean grade 7 reading achievement was significantly lower in 1978-79 than in 1977-78 but significantly higher in 1979-80 than in 1978-79 and significantly higher in 1980-81 than in 1978-79. The significantly higher reading achievement of the 1979-80 and 1980-81 grade 7 group in comparison with the 1978-79 group resulted from the following planned changes specifically related to reading: goal setting in reading by the staff of each I & A Unit to increase the mean reading achievement of their group, providing a better instructional program for the individual student with special attention given to students achieving below expectancy, and replacing much of the separate-skills reading instruction in the reading laboratory with CAI reading. As noted earlier, the lower mean reading achievement of the 1978-79 grade 7 group, in comparison with the 1977-78 group, is regarded as unrelated to any planned improvement activities.

The significantly higher language achievement of the grade 7 groups of 1979-80 and 1980-81 over the groups of the prior years is related to goal setting by the I & A Unit teams to increase the mean achievement of the total student body of the I & A Units and to providing more effective instructional programs for individual students in language. The significantly higher mean achievement in language of the 1978-79 grade 7 group over the 1977-78 group cannot be accounted for in terms of planned improvements or unanticipated events. The significantly higher spelling achievement in 1980-81 vs. 1977-78 resulted from the goal setting and related improvement activities that started in 1979-80. The lack of significantly higher grade 7 mean spelling achievement from year to year, except 1980-81 vs. 1977-78, is probably related to the fact that in 1977-78 the mean spelling achievement was already quite high.

The significantly higher grade 7 math achievement in 1979-80 and 1980-81 in comparison with 1977-78, and in 1980-81 vs. 1978-79 is attributed to the following focused planned changes: use of the results of the locally constructed math test and the standardized test in setting goals and in implementing them in 1979-80, and more computer-assisted instruction in math starting in the second semester.

We shall now focus on the findings and planned improvements for the grade 8 groups. The significantly higher reading achievement of the 1980-81 grade 8 group over the 1977-78 and 1979-80 grade 8 groups is related to the planned improvements in 1979-80 that were continued into 1980-81. They included use of the goal setting strategy and more students receiving CAI in reading.

The grade 8 1980-81 group achieved significantly higher than the 1977-78 and 1978-79 groups in language. This reflects the use of the goal setting strategy.

The significantly higher spelling mean, 1979-80 vs. 1977-78 and 1980-81 vs. 1977-78, is related to goal setting by the I & A Unit teams and carrying out the related planned improvements. The significantly higher mean in grade 8 spelling in 1978-79 over 1977-78 cannot be related to any planned improvements or unanticipated events.

The significantly higher math achievement, 1979-80 vs. 1977-78, 1980-81 vs. 1977-78, and 1980-81 vs. 1978-79, is associated with use of the locally constructed and standardized achievement test results in implementing the goal setting strategy, and the CAI math that started in the second semester of 1978-79.

A summary of the mean achievements of the three cohorts is shown in Table 3.9. The mean achievement of Cohort 3 was significantly higher than that of Cohort 1 or Cohort 2 for four of eight comparisons and not significantly different for the other four. The mean achievement of Cohort 2 was significantly higher than the mean of Cohort 1 for two comparisons, significantly lower for one, and not significantly different for the other. The lower achievement of Cohort 2 in reading is not explainable. The fact that, in general, the other two cohorts achieved higher than, or not significantly different from the earlier ones, is related to the implementation of the goal setting strategy in 1979-80 and to the refinement of the instructional programming strategy from year to year.

Table 3.9. **Summary of Findings Regarding Mean Gain and Mean Achievement of Three Successive Longitudinal Cohorts: Steuben Middle School**

	Means of Each Cohort					
	Cohort 1		Cohort 2		Cohort 3	
	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8
Reading Total	46.66	53.53	39.36	48.43	43.14	52.32
Language	40.64	48.23	41.35	46.13	42.75	48.12
Spelling	26.85	29.94	27.43	29.66	26.80	30.69
Math Total	53.30	65.41	55.51	64.90	61.05	67.99
Student N	191		247		216	

	Cohort with Higher Average Achievement		
	Cohort 2 vs Cohort 1	Cohort 3 vs Cohort 1	Cohort 3 vs Cohort 2
Reading Total	Cohort 1	NS	Cohort 3
Language	Cohort 2	Cohort 3	NS
Spelling	NS	NS	NS
Math Total	Cohort 2	Cohort 3	Cohort 3

Results Related to Student Attitudes and Self-Concepts

The IOX School Sentiment Index, Intermediate Level, and the IOX Self-Appraisal Inventory, Intermediate Level, were administered to approximately 50 percent of the students of grade 7 and grade 8 in April of each year 1978-79, 1979-80, and 1980-81. Two of the four classroom groups of each I & A Unit of about 120 students took the Sentiment Index and the other two took the Self-Appraisal Inventory. Students were assigned to classroom groups to be representative of all the students of the particular I & A Unit and also the grade.

The School Sentiment Index has 81 items and the Self-Appraisal Inventory has 77 items to which the student responds True or Untrue.

Attitudes

The percentage of the students of grade 7 and grade 8 for the three years who checked the response keyed as favorable is given in Table 3.10 for the seven subscores. Since the students did not sign their names or give their grade, only the responses of the students in I & A Units having only grade 7 or only grade 8 students were included in this analysis. Therefore, it cannot be inferred that the same students who took the inventory in grade 7 also took it in grade 8. We may note general trends and changes in attitudes from year to year where the difference was 10 percent or more.

Table 3.10. Mean Percent of Favorable Responses to School Sentiment Index for Three Successive Grade 7 and Grade 8 Groups: Steuben Middle School

Subscale	Grade 7			Grade 8		
	1978-1979	1979-1980	1980-1981	1978-1979	1979-1980	1980-1981
1. Teacher: Mode of Instruction	68	73	69	56	57	64
2. Teacher: Authority and Control	51	46	52	42	44	47
3. Teacher: Interpersonal Relationships with Students	52	54	54	35	44	48
4. Learning	54	60	58	52	54	50
5. Social Structure and Climate	56	57	60	45	46	57
6. Peer	70	67	67	67	65	65
7. General	46	49	56	39	39	49
N =	149	127	156	142	150	181

The attitudes of the grade 7 students toward the teachers' mode of instruction and toward peers were generally more favorable than were their other attitudes. Their general attitudes toward school were lower than their other attitudes. Their attitudes in all areas remained relatively constant during the three years except that their general attitudes toward school increased from 46 to 56 percent from 1978-79 to 1980-81.

The attitudes of the grade 8 students were consistently lower than those of the grade 7 students, often more than a difference of 10 percentage points. The grade 8 students' attitudes were most favorable regarding the teachers' mode of instruction and toward peers and were lowest regarding the teachers' interpersonal relationships with students and general attitudes toward school. There was a substantial increase from 1978-79 to 1980-81 in the students' attitudes regarding the teachers' interpersonal relationships with the students, the social structure and climate of the school, and general attitudes toward school. The grade 8 students' attitudes toward teacher mode of instruction, teacher authority and control, learning, and peers remained relatively stable across the three years.

Self-concepts

The IOX Self-Appraisal Inventory measures the self-concept related to peers, family, school (academic), and general. The percentage of the positive responses are given in Table 3.11 for grade 7 and grade 8 for each of the three years.

The mean self-concept of the grade 7 students related to school was less positive than related to the other three areas except in 1980-81 when it was about the same as that related to peers. The mean self-concept of the grade 7 students in all four areas remained relatively stable during the three years.

The self-concepts of the grade 8 students were consistently higher than those of the grade 7 students. The grade 8 students' self-concepts were relatively stable across the three years in all areas except general, for which a drop occurred from 1979-80 to 1980-81.

Table 3.11. Mean Percent of Favorable Responses to Self-Appraisal Inventory for Three Successive Grade 7 and Grade 8 Groups: Steuben Middle School

	Grade 7			Grade 8		
Subscale	1978-1979	1979-1980	1980-1981	1978-1979	1979-1980	1980-1981
1. Peer	70	65	64	77	73	77
2. Family	78	73	76	79	79	76
3. School	58	60	65	63	64	69
4. General	74	69	74	79	75	64
N =	129	101	154	80	90	182

Relationship of Affective Results to Changes and Unanticipated Events

The positive findings related to the attitudes of the grade 7 students were (a) more positive general attitudes toward school in 1980-81 than in earlier years and (b) stable attitudes in the other six areas. The positive findings regarding the grade 8 students' attitudes were (a) more positive attitudes in 1980-81 toward teacher interpersonal relationships with students, toward the social structure and climate of the school, and general attitudes toward school and (b) stable attitudes in the other four areas. The major positive finding regarding the self-concepts of the grade 7 and grade 8 students was the stability related to all four areas across the three years and the quite high self-concepts related to family and to peers. The only negative finding was the drop in general self-concept of the grade 8 students from 1979-80 to 1980-81.

To what may the positive results pertaining to the students' attitudes and self-concepts in 1980-81 be attributed? One contributing factor may have been the human relations program provided to all students, a focused planned change. Clearly, the students' attitudes toward peers and their self-concepts relating to peers remained much the same in 1980-81 as in 1979-80. Whether the training contributed to the more positive attitudes toward teacher interpersonal relationships with the grade 8 students and to the relatively high attitudes toward teacher mode of instruction is uncertain. The human relations training was provided during the first two weeks of the 1980-81 school year by the unit teachers, and it might have contributed to better teacher-student relationships. The fact that an academic team of four teachers taught the 120 students, with each teacher serving informally as an advisor to the students, may have contributed to the highly favorable attitudes toward the teacher mode of instruction.

Conclusions

One purpose of the present research was to determine how well the Steuben staff could implement the following improvement strategies: (a) arranging an appropriate total educational program of courses and other activities for each student, (b) arranging an appropriate instructional program in the subject fields of language, mathematics, reading, and spelling for each student each semester, and (c) setting goals for the students of each I & A Unit and planning and carrying out related improvement activities. It was not feasible for the teachers to plan and monitor individual educational programs of the students in a systematic manner because of the large turnover of students each year. However, the teachers were already arranging individual instructional programs for each student in mathematics, reading, language, and spelling in 1977-78, and they served informally as advisors to the students starting in 1977-78. Goal setting in language, mathematics, reading, and spelling and carrying out related improvement activities were carried out by all the I & A Unit teams starting in 1979-80.

Another objective of the research was to maintain a satisfactory level of student achievement in language, mathematics, reading, and spelling from year to year and to raise achievement that was regarded as unsatisfactory. The grade 7 class of 1979-80 achieved significantly higher than the class of 1977-78 in two of four comparisons and not significantly different in the other two. The grade 7 class of 1980-81 achieved significantly higher than the classes of 1977-78 and 1978-79 in six of eight comparisons and not significantly different in the other two. The grade 8 class of 1978-79 achieved significantly higher than the class of 1977-78 in one of the four comparisons while the grade 8 class of 1980-81 achieved significantly higher than the classes of 1977-78 and 1978-79 in six of the eight comparisons and not significantly different in the other two. The students of each of three successive longitudinal cohorts gained significantly in all four areas from grade 7 to grade 8. Moreover, in all areas except reading total, the achievements of the second and third cohorts were significantly higher than those of a prior one. Similar favorable results were obtained on a locally constructed mathematics test. The attitudes of the students toward school and their self-concepts either remained stable or improved from the first year of testing in 1978-79 to 1980-81. The attendance of the students was about the same from year to year but slightly higher in 1980-81. Based on these findings we conclude that the concurrent implementation of the instructional programming strategy and the goal setting strategy that started in 1979-80 was highly effective in producing desired student outcomes.

The loss of six aides in 1980-81, the closing of the reading/language arts laboratory and the mathematics laboratory in 1980-81, and the changing of the school day in 1980-81 probably had a negative effect on student achievement and student attitudes. However, this effect cannot be assured inasmuch as student achievement and attitudes did not drop off in 1980-81.

CHAPTER 4

WEBSTER TRANSITIONAL SCHOOL

Cooperative improvement-oriented research was carried out with Webster Transitional School during the years 1977-78 through 1980-81. The objectives of the research at Webster and the other schools were indicated in Chapter 2 of this monograph.

The achievement areas selected for attention at Webster were reading, language arts, and mathematics. Changes in student attitudes and the incidence of discipline referrals were also studied.

The administrative arrangement employed at Webster Transitional School to plan, monitor, and implement its improvement activities was its existing Faculty Advisory Committee. This consisted of one teacher from each of its eight Instruction and Advisory Units (I & A Units), three guidance counselors, two teachers from the allied arts team, one teacher from the supportive services team, and the leadership team consisting of the principal, the dean of students, and the instructional consultant. The teachers of language arts, reading, math, science, and social studies and the students were organized into I & A Units.

The remainder of this chapter is organized as is indicated in the Table of Contents. The organization is identical to that of Chapter 3.

Staffing and Student Enrollment

Webster Transitional School is the only middle school of the Cedarburg School District, Cedarburg, Wisconsin. Cedarburg is about 20 miles northwest of Milwaukee. The students are white. The socioeconomic level of the parents of the students is middle and upper middle class. Many parents are employed in Milwaukee.

The staffing of Webster each year, the student enrollment as of September of each year, the average daily attendance for May of each year, and the incidence of discipline referrals follow.

	77-78	78-79	79-80	80-81
No. of building administrators	1	1	1	1
No. of counselors	3	3	2	3
No. of curriculum specialists	1	1	1	1
No. of regularly certificated teachers	44	42	38½	38
No. of learning disability and special teachers of other ex-				

	77-78	78-79	79-80	80-81
ceptional children	2	2	3	4
No. of librarians or media persons	1	1	0*	1
No. of school psychologists (part time)	2	2	2	2
No. of school social workers (part time)	1	1	1	1
No. of other certificated personnel	0	0	0	0
No. of aides	6	5½	5	4
No. of custodial and other non-certificated personnel not counting aides	6	5	5	5
Student enrollment	761	711	686	712
Daily attendance in percent	96	96	96	94
No. of discipline referrals	178	123	66	71

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*IMC Director died in November and was not replaced until 1980-81.

The drop in average daily attendance from 1979-80 to 1980-81 was regarded by the principal as resulting mainly from parents taking their child with them on vacation. The decrease in discipline referrals was regarded as resulting from more personalized instruction and advising.

Data Gathered and Analysis of Data by the Webster Staff

Data regarding student outcomes were gathered annually. These data were summarized and analyzed by the local school staff and were used in determining areas of possible improvement for the ensuing year. After the last data collection in 1980-81, the data on each individual student and on each group of students enrolled in each grade each year were analyzed by the project staff. The data gathering instruments, the schedule of administration, and the analysis techniques of the Webster staff are now outlined.

Iowa Short Test of Educational Ability

Administration: Grades 6, 7, and 8 in April 1978 and grade 6 and new students of grades 7 and 8 in April 1979, 1980, and 1981.

Analysis: Obtain the mental ability score from the test publisher's computer printout for the students of each of the eight I & A Units. Divide the students of each grade of each I & A Unit (five I & A Units contained grade 6 and grade 7 students and three had only grade 8 students) into quarters based on mental ability. Do the same for the total enrollment in each grade 6, grade 7, and grade 8. Compute the mean mental ability of each quarter of the students of each grade of each I & A Unit and of the total students of grade 6, grade 7, and grade 8. Change the means to the equivalent national percentile ranks.

Gates-MacGinitie Reading Tests: Vocabulary and Comprehension

Administration: Grades 6, 7, and 8 in April 1978, 1979, 1980, and 1981.

Analysis: Enter the standard scores in vocabulary and comprehension of each student of each quarter of mental ability. Compute the mean of each quarter in each area tested. Change the mean to a national percentile rank using the appropriate test manual table(s). This permits comparison of the mean percentile rank in achievement of each quarter with their mean mental ability percentile rank.

Locally constructed language arts test of 306 items: Parts of speech, sentences, total

Administration: September, grade 6; September, grade 7; May, grade 7; and May, grade 8 of 1977-78 through 1980-81 except that it was not administered to grade 6 in 1980-81 because a new test was introduced, starting with grade 6.

Analysis: Same as Gates-MacGinitie Reading Tests.

Locally constructed mathematics test of 250 items: Six subscores and total

Administration: September to grades 6, 7, and 8 and May to grade 8 in 1977-78 through 1980-81 except that it was not administered to grade 6 in 1980-81 because a new test was introduced, starting with grade 6.

Analysis: Same as Gates-MacGinitie Reading Tests.

IOX School Sentiment Index (Intermediate level): Seven scores--Teacher Mode of Instruction, Teacher Authority and Control, Teacher and Student Interpersonal Relationships, Learning, Social Structure and Climate, Peer, and General.

Administration: Annually to the grade 6, grade 7, and grade 8 students of each I & A Unit, starting in the spring of 1979.

Analysis: Compute mean percent of favorable responses for each subtest for each grade 6, grade 7, and grade 8 and for each I & A Unit. (This could not be related to mental ability percentile ranks since the students did not put their names on answer sheets.)

Information from school records: Average enrollment for 1977, 1978, 1979, 1980. Percentage of average daily attendance for 1977, 1978, 1979, and 1980. Number of students referred to principal annually for discipline.

Improvement Strategies Implemented by the Webster Staff

The three improvement strategies involved use of the preceding data on student achievement as well as other information regarding the student. One strategy was to arrange an appropriate educational program of courses and other educational activities for each student each semester. The second strategy was to arrange an appropriate instructional program for each student in each course. The last strategy involved setting goals and planning and carrying out related improvement activities either to maintain or to raise the mean educational achievement of the students of each quarter in mental ability of each I & A Unit.

The teachers of each academic team planned complete educational programs with their advisees and monitored their progress on a weekly basis. The teachers planned and monitored the instructional programs of the students in their classes on a daily basis.

Informal planning and implementing improvement activities for the students of each mental ability quarter of each I & A Unit, using the results of the locally constructed tests in language arts and mathematics, started in the fall of 1978-79. Goal setting in language arts and mathematics by all the academic teams started in 1979-80 and continued into 1980-81.

We may now examine how Webster used the information gathered each year to select its improvement areas. Then we shall see how the information on individual students was used.

The locally constructed achievement test scores and the mental ability test scores were summarized annually as indicated earlier, and summary tables were prepared and presented to appropriate groups of teachers. (The information regarding the students of each I & A Unit was made available only to the I & A Unit staff.) Table 4.1 is the summary table that was prepared for each of the three I & A Units in which all the grade 8 students of 1978-79 were enrolled.

Table 4.1 gives the mean percent correct in each area of mathematics for each quarter of the students in mental ability (group) of each of the three I & A Units (pods) and also the mean mental ability percentile rank. The information is given for the same students when in grades 6, 7, and 8. The principal had all of this information, and each I & A Unit had the information for its unit as well as a summary for all of the grade 8 students. Having this information enabled the principal and the teachers of the respective I & A Units to make several assessments. First, noting the achievements of the students of each quarter of mental ability, they estimated how well their educational processes in each area of mathematics were working for each quarter of the students of their I & A Unit. Second, they compared how each particular quarter of the students achieved across all six areas of mathematics. Third, they estimated how well each quarter

Table 4.1 Quarters of Three 1978-79 Grade 8 Pods (Groups of Students) in Mental Ability and the Mean Percent Correct on 6 Subtests and Total of a Locally Constructed Mathematics Test. Percent Correct Based on Administration of the Tests when the Students Were in Grade 8 in Fall and Spring of 1978-79, in Grade 7 in Fall of 1977, and in Grade 6 in Fall of 1976: Webster Transitional School

Subtest	Date Administered	Pod B Groups				Pod D Groups				Pod C Groups			
		A*	B*	C*	D*	A	B	C	D	A	B	C	D
Whole Numbers	1976 (F)	64	62	55	49	66	49	45	44	76	67	56	48
	1977 (F)	80	81	80	70	88	80	69	59	87	78	74	68
	1978 (F)	90	84	85	79	87	82	76	69	88	83	79	71
	1979 (S)	91	94	92	87	90	85	81	73	92	92	87	81
Fractions	1976 (F)	16	15	13	2	20	14	10	7	28	12	11	3
	1977 (F)	56	50	42	27	65	47	35	31	60	49	36	25
	1978 (F)	79	64	71	51	83	71	58	49	83	71	64	50
	1979 (S)	94	86	88	84	89	85	81	65	91	87	81	71
Decimals	1976 (F)	6	5	4	2	9	6	2	4	19	11	3	3
	1977 (F)	48	44	41	19	58	50	30	18	57	37	25	20
	1978 (F)	80	63	72	57	83	76	59	50	66	56	47	39
	1979 (S)	89	89	91	74	88	88	78	70	91	84	82	72
Percent	1976 (F)	0	0	3	0	5	1	0	1	6	0	0	0
	1977 (F)	29	25	9	0	36	21	10	2	30	13	6	3
	1978 (F)	60	37	40	18	68	43	28	19	14	8	6	1
	1979 (S)	81	76	74	65	87	72	56	43	60	57	50	43
Integers	1976 (F)	0	2	0	2	0	3	0	0	5	0	0	2
	1977 (F)	17	5	5	4	13	5	4	0	29	3	8	0
	1978 (F)	57	44	36	21	59	39	24	24	53	28	29	17
	1979 (S)	91	84	81	73	93	79	79	64	94	90	88	71
Geometry	1976 (F)	2	6	1	2	4	1	0	0	9	1	4	1
	1977 (F)	13	9	8	3	14	6	2	2	28	11	11	10
	1978 (F)	34	28	20	12	41	31	14	17	29	19	11	11
	1979 (S)	62	51	42	35	72	62	49	36	69	54	50	40
Total	1976 (F)	16	15	14	9	19	14	10	10	26	16	13	9
	1977 (F)	47	41	33	23	52	40	28	23	51	37	29	23
	1978 (F)	72	57	60	46	75	61	48	41	61	49	45	36
	1979 (S)	88	83	81	74	88	80	75	62	88	80	76	65
National Mean IQ Percentile		93	79	61	36	94	76	52	34	95	78	61	41

A* = Fourth Quarter
B* = Third Quarter
C* = Second Quarter
D* = First Quarter

gained in each area from September of 1976 in grade 6 through May of 1978 in grade 8. Finally, each I & A Unit team was able to compare the results for its students with the results for the entire grade 8 class while the principal could make the comparisons among the three I & A Units as well.

Based on these assessments, the principal and the staff of each I & A Unit starting in 1979-80 formulated goals and developed related plans either to maintain or to raise the achievement level of each quarter in the various areas and also the mean achievement of the total I & A Unit in one or more areas.

The teachers of each I & A Unit used information regarding each student in the following manner starting in 1978-79. They compared the mental ability of each student with the percent correct in each area of mathematics. This permitted the identification of students who were not only low in achievement in any area but also low in achievement in relation to ability. Students whose achievements were farthest below ability were selected for special attention. If the teachers concurred that the student was not achieving up to ability, a goal was set for the student to achieve higher, and activities to secure higher achievement were planned and implemented by the teachers. In addition to activities during the school day, activities after school and on Saturdays as well as summer classes were strongly recommended for the under-achievers and also other low-achievers.

Description of Webster Transitional School as of 1977-78

Webster Transitional School is described as it was functioning in 1977-78. This description provides the necessary information for relating the student outcomes of 1977-78 to Webster's implementation strategies and organization structures and processes of 1977-78 and also to the changes in the strategies and structures that occurred each year thereafter.

Background and Philosophy

Webster Transitional School opened in 1978 and replaced the Cedarburg Junior High School. During the period from 1967 to 1972, committees composed of school personnel, board of education members, citizens, and external consultants shared in formulating the school's philosophy, curriculum, and instructional arrangements. They also developed educational specifications for the new building.

The administrative arrangements, organization for instruction, and instructional arrangements followed the pattern of Individually Guided Education that was already employed by Cedarburg's elementary schools. Appropriate modifications of the elementary pattern were made and new concepts were introduced to meet the needs and characteristics of the middle school student population of Cedarburg and also the desires of the citizens.

The Webster School philosophy rests on the belief that every individual student has the potential for developing academically, socially, and creatively. This belief reflects what is known about the learning process and the nature of the early adolescent.

Keeping in mind the many areas of student development--intellectual, physical, social and emotional--Webster School has established the following goals directed toward the development of the total student. These goals are a synthesis of the expressed desires of citizens, the faculty, and the parents.

> The middle school promotes growth in basic learning skills and academic concepts.
>
> The middle school guides the student toward proficiency in independent learning, keeping in mind the continuing need to learn throughout life.
>
> The middle school provides a wide variety of curriculum experiences involving the student in situations which will develop social skills and cultural understanding.
>
> The middle school develops self-discipline and responsibility through a variety of enriching activities.
>
> The middle school encourages each student to understand and accept his or her role as a developing adolescent--an individual with personal needs, values, and shared social responsibilities.

Administrative Arrangements

The principal is the only certified administrator at Webster. His specific duties include monitoring all instruction and developing a master schedule to facilitate the attainment of the school's goals. He is also responsible for the hiring, placement, supervision, and evaluation of the professional and nonprofessional staff, leading staff development and inservice activities, and preparing the budget and supervising all funds and accounts. The principal works directly with the staff in their team meetings and deals with some students in special cases. Finally, the principal plays a lead role in the communications and public relations between the community and the school staff.

Leadership team. The leadership team is composed of the principal, the dean of students, and the instructional consultant. The instructional consultant assists the teachers and the teaching teams in such matters as the diagnosis of student needs, the development of curricular offerings, planning for student attainment of learning objectives, selection and use of instructional materials, planning special units of instruction, initiating curriculum innovations, and evaluation of student progress. She is also responsible for monitoring the continuity of the curricular offerings in each subject across grades 6 through 8. The dean of students is responsible for guidance and various other pupil services. Parental contact is maintained through his office. He serves as an organizer and coordinator of class scheduling, the testing program, student records, student activities, and the counseling program.

Faculty advisory committee. The faculty advisory committee is composed on one member from each academic team, two members of the allied arts team, a member of the supporting services team, a student representative (optional), the three members of the leadership team, and two counselors. It meets weekly. It shares decision making with all members of the professional staff on matters related to the daily operation of the school. Emphasis is on involving the staff in policy making rather than on the diffusion of information. The committee organizes and holds inservice meetings and also general faculty meetings.

Organization for Instruction and Advisement

The organization for instruction and student advising is the academic I & A Unit, also referred to as a pod because of the physical arrangement of the building. Each academic I & A Unit is composed of 75 to 100 students and a team of 3 to 4 teachers. There is also an allied arts team and a support team.

The school has eight academic I & A Units. Five are composed of 6th and 7th graders while three have only 8th grade students. The teachers of each I & A Unit are responsible for the instruction of the students of their unit in language arts, reading, mathematics, social studies, and science.

The allied arts team is composed of 13 teachers; two each from industrial education, home economics, and art; three from music; and four from physical education. The support team has six members and includes the director of the instructional materials center, two guidance counselors, a reading consultant, and two special education teachers.

Teaching and learning are aided by the physical design of the building. Each I & A Unit is housed in a separate pod of the building. The large open areas of the pods and movable furniture allow teachers to utilize different groupings for instruction, including large group, small group, and individual study. Instructional materials are stored either in the pod or are within easy access in one of two instructional material centers. The students of each I & A Unit have direct access to an IMC.

The primary functions of the I & A teams are to plan instructional programs appropriate for each student of the unit, to teach, to advise, and to evaluate. Within each team, a specialist is identified for each subject. This specialist assumes responsibility for formulating the objectives of the particular subject for the students of the unit. The same teacher is also a member of a subject team of the school and works on the development of objectives and content in the subject on a schoolwide basis (grades 6 through 8).

For example, a teacher with expertise in the area of language arts identifies the objectives in language arts for the students of the unit and plans the related teaching activities and evaluation procedures for the team. This assures that what is planned and taught is substantively sound. The specialist in each subject field may also teach the subject to all the students of the unit without the assistance of other team members, or some team members may also teach some of the students.

Every teacher of each I & A Unit teaches some of the students the basic skills which the team identifies as needed by the students. Each team of teachers sets a time when each teacher teaches a different skill in the same subject to students who have not yet mastered the skills; for example, math skill groups for addition, subtraction, multiplication, and division: reading skill groups for word recognition, vocabulary, etc.; and language arts skill groups for grammar, handwriting, or spelling.

Decisions regarding the use of time, facilities, and materials are made by the team as a whole. In addition, grouping of students for instruction is a team task.

The use of time and the placement of students into instructional groups and for individual study are highly flexible within each I & A Unit.

Some teams of teachers divide the students of their units into five groups for the language arts, math, science, and social studies to serve a smaller pupil teacher ratio. While each of the four teachers is working with a group, the fifth group, that may be class-sized, has individual study time in the center of the pod. Other flexible ways for using time include longer time blocks per day in any subject and not having instruction in every subject every day.

There are no permanent "team leaders." Instead, members of each teaching team share the responsibility for four positions that generally rotate monthly or quarterly: team leader, team recorder, representative to the Faculty Advisory Committee, and Pod Council Advisor.

The person who serves as the team leader establishes the agenda and chairs the formal weekly team meeting. During these meetings major instructional decisions are made for the unit, teaching assignments are made, evaluation results are discussed, and nonteaching tasks are shared. The instructional consultant and a counselor assigned to the team attend the formal team meetings. Other school personnel, including the principal and reading consultant, may attend.

Each teacher of an I & A Unit serves as an advisor to some of the students of the unit. Members of the allied arts team and the support team also advise some students of each I & A Unit.

The teacher advisory program focuses on human development activities. The teacher advisors meet with their advisees on Monday during the last 15 minutes of the day and on Thursday mornings for 30-60 minutes. Whole group, small group, and individual activities during these sessions deal with goal setting, decision making, values clarification, career awareness, and other matters. Advisors also meet with their groups or with individual students outside the regularly scheduled sessions and also outside regular school hours to discuss educational programs, meet the student's family, get better acquainted, and for other purposes. During the summer of 1977 a handbook for teacher advisors was developed. It offers a structured, developmental approach for teacher advisors to use in their teacher advisor activities.

Pattern of Curriculum and Instruction

Courses. All students receive instruction in mathematics, language arts, reading, social studies, and science each semester. The students of the combined grade 6 and 7 I & A Units take one semester each of art, home economics, industrial education, and music and two semesters of physical education, a total of three required classes in these "allied arts" areas each semester. The students of the grade 8 I & A Units also take physical education and two elected classes in the allied arts each semester. Boys and girls are enrolled in the same classes in the allied arts. Besides the electives for eighth graders in allied arts, there are 40 mini-courses taught for 1-hour sessions on Tuesdays during 12 weeks of the school year. The mini-courses are elective and are open to all students.

Within each curricular area there is great variation in the activities of individual students in line with the philosophy of aiding each student to achieve continuous progress at a pace appropriate for the individual student. Both the scope and the sequence of instruction in each curricular area, grade 6 through grade 8, are continuations and extensions of the elementary school curriculum.

Instructional materials. The instructional materials include books and other printed materials distributed by commercial publishers, curriculum guides and similar material prepared by the Webster teachers, and a wide range of audiovisual materials. All of the materials are correlated with the instructional objectives in the various academic courses.

Books and other materials for each unit of instruction are placed in the pod area or in learning centers in the instructional materials center when the particular unit is being taught. The books are used during the day and may be taken out by an individual student for one night at the end of a school day. Films, filmstrips, film loops, videotapes, charts, mimeograph materials, and other audiovisual materials are also available in the instructional materials centers for use by individuals, small groups, whole classes, or all the students of the pod.

Materials, equipment, and supplies that enable teachers to meet the varying interests and educational needs of the individual students are also used in the allied arts, including home economics, industrial arts, music, and art.

There are two instructional materials centers. Each center is surrounded by four of the school's eight pods in such a way that each pod has direct access to one of the centers. In addition to many materials, each instructional materials center is equipped with calculators, cassette records/players, viewers, and other audiovisual equipment. The seating capacity for the two centers combined is 152.

Extracurricular activities. Athletic extracurricular activities include basketball, gymnastics, track, softball, and wrestling. Other activities include forensics, the school newspaper, the yearbook, the variety show, jazz band, instrumental ensemble, natural history museum, and folk dance club. Students are also encouraged to participate in the activities of student government.

Special programs. Approximately 40 students are enrolled in a program for students with learning disabilities and 20 to 25 in a program for students with emotional disturbances. Students with other exceptional needs are enrolled in another school of the district.

Arranging Each Student's Educational Program

The complete educational programs of individual students are planned with their teacher advisors. The students' individual instructional programs in each course are arranged in the following manner. Students are assigned heterogenously to I & A Units at the beginning of the year. Within each I & A Unit, students who are working toward the achievement of the same objectives in each language arts, reading, and mathematics are usually grouped together for various lengths of time. In these curricular areas students proceed at rates partly determined by the teacher and the students. In science and social studies, as well as in the allied arts, students proceed at the same pace through the various units of instruction during the year, but there are enrichment activities for the rapid achievers and individual attention, tutoring, and other activities for the slow achievers, as time and resources permit.

The length of time given to units of instruction may be as short as two weeks or as long as six weeks. Similarly, the amount of time given to instruction in any of the academic subjects may vary from one day to another since students do not pass from one class to another according to a time schedule.

In placing students at the beginning of each school year, the teachers of each I & A Unit examine each student's record from the prior school year and also give their criterion-referenced mathematics and language arts tests to identify the objectives that each student has and has not mastered. Based on this assessment, an instructional program is arranged for each student. Students who are working toward the same objectives are typically grouped together for instruction. Teachers working as an I & A Unit team provide large-group, small-group, and individual learning activities to meet the needs of their students. They also adapt the instructional materials and the amount of instructional time to take into account individual student's characteristics. Students are evaluated for the attainment of the objectives of each unit of instruction.

Not all students master all objectives. However, certain objectives have been determined as minimum skill competencies in mathematics and reading. If students do not master these objectives when in a certain grade, parents are notified; and students are required to attempt to master these objectives during the school year or in summer school.

Career Awareness and Exploration

There is not a systematic, organized program of community learning and work experiences, although field trips are utilized extensively in all curricular areas. In addition, the school provides an opportunity for all students of grade 8 and their teachers to participate in a week-long Outdoor Education Program held in the fall each year.

Eighth grade teachers of science, social studies, and language arts are also able to utilize the Outdoor Classroom located on the school grounds as a setting for various instructional units which are normally included in their subject areas. This Outdoor Classroom has been developed over the past three years by students and teachers with the assistance of the community and the Wisconsin Department of Natural Resources. Community resource persons also come into the school and make presentations to classes throughout the year.

In addition to these activities, a definite plan in the allied arts classes for grade 8 is to promote career exploration activity during the year. This activity is concluded with a Career Day each spring during which students attend three 30-minute career information sessions conducted by people who work in the field being presented. At least 30 resource people conduct these sessions.

Evaluation Activities

Teacher-constructed paper-and-pencil tests, teacher observations, performance tests, and work samples are used in evaluating student progress. These evaluation procedures are related directly to the objectives for each unit of instruction. Students receive report cards with letter grades in each subject every nine weeks. The letter grades are as follows:

A. Outstanding Individual Progress

B. More than Satisfactory Individual Progress

C. Satisfactory Individual Progress

D. Less than Satisfactory Individual Progress

F. Unsatisfactory Progress

In addition to the letter grades, report cards also include a statement as to whether the student is performing at, above, or below grade level and written comments which give an indication of student effort in each subject.

The primary instruments utilized in the annual evaluation of student achievement are the Iowa Short Test of Educational Ability, the Gates-MacGinitie Reading Tests, and locally constructed criterion-referenced tests in language arts and mathematics. These tests are administered to all students in grades 6, 7, and 8 except the Iowa Short Test of Educational Ability, which is administered to only the grade 7 students.

Home-School-Community Relations

Parent visits, parent conferences, and a parent newsletter are used to relate home and school. There is also a parent advisory committee, and some parents serve as volunteers.

Two yearly events are held for parents. One is the open house in the fall, an opportunity for students and their parents to visit school one evening from 7:00 to 9:00 p.m. The teachers of each I & A Unit explain unit operations and also their individual methods of teaching, evaluating, and advising, as well as matters related to the various academic subjects. Another event is the allied arts festival held in the spring. Each team of allied arts teachers displays student accomplishments and gives demonstrations.

Besides the open house and the allied arts festival, one school week is set aside for parent visitations during school hours to acquaint parents with the instructional processes and arrangements. Student senate members serve as guides to the parents who observe classes in action.

In accordance with school policy, the advisors of the students meet with each parent twice per year, at the end of the first and third quarters. Two afternoons and one evening are set aside each quarter for this purpose. Students are required to be present at the conferences, and in many instances, actually conduct the conferences. The student's self-evaluation and teacher's evaluations of the student are used as a basis for this conference. The student rates himself or herself on class and test work, ability to work in groups, neatness, responsibility, and goal-setting. Teachers of the students evaluate the student using the same form. These conferences replace conventional report cards.

Other individual conferences may be initiated by either parents or teachers. These conferences are held during the teacher's planning period or after school hours.

The Webster Newsletter comes out once per month and is given to students to deliver to their parents. The first section has general school news. Each of the eight I & A Units has a section giving information about its activities, e.g., field trips, curriculum, or individual student achievements. Another section is given to the allied arts.

The Parent Advisory Committee was formed in 1972 to foster school-community relationships and to provide input into the development of school policy and programs by parents. The Committee holds meetings throughout the year for groups of parents who have a mutual interest, e.g., 5th grade parent orientation to the middle school, 8th grade parent orientation to Cedarburg High School, Webster's teacher/advisor program, etc.

Volunteer parents give assistance to the IMC, chaperone field trips, and help as tutors or aides. They also serve as chaperones in the outdoor Education program and for activities sponsored by the Student Senate. Members of the community are also invited to make presentations to classes as guest speakers on occasion.

Internal and External Support

The teachers of each I & A Unit are provided with a daily common preparation time which they use for team planning and other matters related to instruction. Teachers of each department of allied arts are also allocated a common planning time each day. They are also free for one-half hour daily at the same time after lunch.

The Cedarburg School District makes funds available each year to allow Webster teachers to work on curriculum projects. Money is given to the school on a lump-sum basis, and allocation of portions of that sum are made by the instructional consultant after determining needed projects with the principal and department members. These funds are available throughout the school year as well as during vacation periods.

Continuing Research and Development

In cooperation with the Wisconsin Center for Education Research, a comprehensive program of cooperative research was started in 1977-78. The purposes of research were indicated in Chapter 2.

Unplanned Events, Non-Specific Planned Changes, and Focused Planned Changes 1977-78 through 1980-81

Three kinds of changes follow in outline form for each year of the four years of the study: (a) unplanned events that in the judgment of the principal might have influenced the student outcomes, (b) non-specific planned changes related to some aspect of the school program that were not directed toward raising educational achievement in reading, language arts, mathematics, or student attitudes, and (c) changes focused on the improvement of student achievement or attitudes.

1977-78

The data gathering instruments, the time schedule for gathering data, the data analysis procedures, and the improvement strategy were outlined. Procedures already in place in 1977-78 for identifying and providing for individual student's needs as indicated in the 1977-78 description of the school were continued.

1978-79

Unplanned event

Two three-teacher I & A Units were formed to replace three four-teacher units due to decline in enrollment.

Contract negotiations during the second semester of the year resulted in lower teacher morale.

Non-specific planned change

A teacher advisor, parent-teacher conference committee was established and plans were made to hold two afternoon and one evening conference in 1979-80. District support was provided to all teachers for a one-day inservice program.

A Career Day was started for the students of grade 8.

Focused planned change

Objective-based instruction in mathematics was refined and related to the mathematics program of the elementary school.

The objective-based language arts program and the related locally constructed language arts tests that were used in grades 6 and 7 in 1977-78 were used in grade 8 for the first time in 1978-79. One teacher of each grade 6, 7, and 8 met during the summer to prepare the language arts curriculum guides for grades 6, 7, and 8. (The effects should be reflected in achievements of grades 6, 7, and 8 students in fall 1979-80 testing.)

A one-day inservice program dealing with objective-based reading instruction was conducted. In the summer of 1979 the instructional consultant and two teachers prepared a reading guide for grades 6, 7, and 8. (This approach to reading was related to performance-based reading education, not to what is measured by the Gates-MacGinitie Reading Tests).

Goal setting in mathematics was tried out in some I & A Units.

1979-80

Unplanned event

All grade 8 I & A Units and three of five grade 6-7 units were changed to three-teacher teams due to the continuing enrollment decline and the related loss of teachers.

Contract negotiations during the second semester of the year related to reducing the number of teachers resulted in lower teacher morale.

Non-specific planned change

Career education for grade 8 students was extended and refined through the teacher advisor program.

Use of a new performance-based language arts test and a new performance-based mathematics test started in grades 6, 7, and 8.

Focused planned change

A research and development committee was established to examine the data gathered annually and to lead the goal-setting process throughout the school.

Goal setting for the students of each I & A Unit was started in reading, language arts, and mathematics and continued into 1980-81. Some individual students set goals with their teachers, and I & A Unit teams set goals for the quarters of their composite group of students. The child-parent-advisor conferences in 1980-81 included planning the child's educational program and reporting of progress. The goals of Pod 1 for 1980-81 follow:

1980-81 TEAM GOALS - POD 1

1. To help the students grow in the following areas: academic development, social skills, and emotional well-being.
2. Emphasis will be put on team teaching by the staff with the use of varied techniques such as individualized learning, large group tasks, and small group committee work to develop skills in problem areas.
3. To develop a pod unity and spirit by stressing individual involvement, responsibility, and self-discipline.
4. To recognize our role in the students' transition from the middle school to the high school.

5. To be more aware of which students compose each quarter in order to more effectively monitor performance changes.

Mathematics

6. To stress accuracy as a test-taking skill in mathematics.
7. To improve performance in the C and D quarters in the area of percent.
8. To improve performance of all quarters in the area of geometry.

Reading

9. To improve the performance of the D quarter in the area of comprehension.
10. To improve the performance of the B quarter in vocabulary and comprehension.

Language Arts

11. To improve the performance of the B quarter in the parts of speech and sentences areas.

School Sentiment Index

12. To improve the C and D quarters and EEN students in relation to the learning and general categories.

Goal setting related to student attitudes for one or more quarters of each I & A Unit was started.

Child-parent-teacher conferences were held on two occasions during the year; these conferences focused on the child's program and progress in mathematics and reading and on grades.

Performance-based reading instruction was started in grades 6, 7, and 8.

1980-81

Unplanned event

One grade 6-7 I & A Unit changed back to a four-teacher team due to an increase in enrollment.

Six new teachers were employed, four of whom were involved in teaching reading as well as other subject matter.

Non-specific planned change

A new performance-based reading test was used for the first time in grade 6.

A career center was established in the IMC.

Focused planned change

Goal setting related to language arts, mathematics, reading, and student attitudes was continued.

Results Related to Educational Achievement

The results for three successive grade 6, three successive grade 7, and two successive grade 8 classes and for two grade 6-7-8 longitudinal cohorts are reported in this part of the chapter. The three successive grade 6 classes start with 1977-78, the three successive grade 7 classes with 1978-79, and the two successive grade 8 classes with 1979-80.

A note is in order regarding the grades included and those not included. It will be recalled that the grade 6 class of 1980-81 was administered different tests; therefore, it was not included as a fourth successive grade 6 class. The grade 8 classes of 1977-78 and 1978-79 were administered the locally constructed tests. However, the results are not reported for these grade 8 classes because the scores of the individual students were transmitted to the high school with the students but were not retained. The first data available on individual grade 8 students was in 1979-80 and on individual grade 7 students in 1978-79.

Much information is presented in this chapter in summary tables. The original tables on which the summary tables are based are listed in the Appendix and are reported in Klausmeier, Serlin, and Zindler (1982).

Participating Students

Table 4.2 gives the total number of students, the number of boys and girls, and the mean raw mental ability scores for the successive grade 6, grade 7, and grade 8 classes. This is the total number of students who took the mental ability test. The Ns for grade 6 ranged from 204 to 212, and their mean mental ability from 112.57 to 115.63. The Ns for grade 7 ranged from 195 to 215 and for grade 8 from 205 to 215. The mean mental ability scores for the grade 7 classes ranged from 112.97 to 115.21 and for the total grade 8 classes from 114.33 to 115.21. Similar variations in mental ability were found for the girls from year to year and also for the boys. We should recognize that not all of these students took all the other tests administered in each grade and not all of them were enrolled in Webster all three years.

Table 4.2. Total Number of Students of Grades 6, 7, and 8 and Their Mean Mental Ability: Webster Transitional School

	1977-1978			1978-1979			1979-1980		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
GRADE 6									
Total	205	115.63	13.29	212	114.37	11.27	204	112.57	11.13
Male	103	116.51	13.41	103	115.65	10.99	86	112.77	10.51
Female	102	114.75	13.17	109	113.16	11.45	118	112.42	11.60

	1978-1979			1979-1980			1980-1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
GRADE 7									
Total	215	115.21	13.53	208	114.34	11.45	195	112.97	11.20
Male	109	116.31	13.37	102	115.61	11.16	82	113.62	10.43
Female	106	114.08	13.66	106	113.11	11.64	113	112.50	11.75

	1979-1980			1980-1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD
GRADE 8						
Total	215	115.21	13.53	205	114.33	11.45
Male	109	116.31	13.37	97	115.76	11.18
Female	106	114.08	13.66	108	113.05	11.59

Accordingly, the information in Table 4.2 is presented only for descriptive purposes and will not be discussed further.

Information Gathered

Appropriate forms of the Gates-MacGinitie Reading Tests were administered annually to the students of grades 6, 7, and 8 in the spring. Two scores were obtained: vocabulary and comprehension. A 306-item locally constructed language arts test was administered in September to grade 6, in September and in May to grade 7, and in May to grade 8. Three scores were obtained: parts of speech, sentences, and language total. A 250-item locally constructed mathematics test was administered in September to grade 6, September to grade 7, and September and May to grade 8. Although there are six subscores, only the total score was analyzed as an overall measure of achievement. The Iowa Short Test of Educational Ability was administered in April to the students when in grade 6 and to new students of grades 7 and 8.

In the analysis of the data the following scores were used: the raw scores of the locally constructed tests, the standard scores of the Gates-MacGinitie Reading Tests, and the IQ scores from the Iowa Short Test of Educational Ability.

Comparison of Achievements of the Successive Grade 6, Grade 7, and Grade 8 Classes

The number of grade 6 students taking any one of the locally constructed tests in the fall ranged from 165 to 193 in 1977-78, from 178 to 182 in 1978-79, and from 180 to 183 in 1979-80. The number of grade 6 students taking the Gates-MacGinitie Reading Tests in the spring of the three years ranged from 200 to 204. The number of grade 7 students taking the locally constructed tests in the fall or spring ranged from 189 to 203 for the three years. The number taking the Gates-MacGinitie in the spring of the three years ranged from 190 to 215. The number of grade 8 students taking either locally constructed tests or the Gates-MacGinitie in the fall or spring of the two years ranged from 201 to 215.

Table 4.3 shows the nonsignificant differences, the differences that were significant at or beyond the .05 level, and the post-hoc comparisons of the means that were significant.

The grade 6 results for the fall on the locally constructed tests reflect the student's achievement prior to enrolling at Webster. The mean achievement of the girls averaged across the three years was significantly higher than the combined mean of the boys in parts of speech, sentences, language total, and mathematics. Pertaining to the successive classes, the mean of the last grade 6 class (1979-80) in mathematics was significantly higher than the mean of the 1978-79 class and the 1977-78 class. In the spring testing with the Gates-MacGinitie, no difference between any two grade 6 classes was significant for reading vocabulary; however, the grade 6 classes of 1978-79 and 1979-80 achieved significantly higher than the grade 6 class of 1977-78 in reading comprehension. The difference between the mean achievements of the boys and girls averaged across the three years was not significant in vocabulary or comprehension.

Moving to the results for grade 7 as shown in Table 4.3, we see that the mean of the girls averaged across the three years was significantly higher than the mean of the boys in parts of speech, sentences, and language total in both the fall and spring and significantly higher than the boys in mathematics in the fall. Regarding the comparative achievements of the successive grade 7 classes, the mean achievement of the last class (1980-81) was significantly higher than that of both of the two prior classes in the fall and spring in parts of speech, sentences, and language total. In the fall, the means of the grade 7 1979-80 and 1980-81 classes in mathematics were significantly higher than the mean of the 1978-79 class. Turning to the results of the Gates-MacGinitie Reading Tests, we see that the 1979-80 grade 7 class achieved significantly higher than the 1978-79 class in vocabulary. However, the 1980-81 class achieved significantly lower on vocabulary than either prior class. On the other hand, the 1980-81 class achieved significantly higher than the 1978-79 class and the 1979-80 class on

Table 4.3. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement and Post-hoc Comparisons for Three Successive Grade 6, Three Successive Grade 7, and Two Successive Grade 8 Classes: Webster Transitional School

	FALL			SPRING		
	Class	Sex	C X S	Class	Sex	C X S
GRADE 6: 1977-78, 1978-79, 1979-80						
Parts of Speech	NS	<.001[1]	NS	Test not given		
Sentences	NS	<.001[1]	NS	Test not given		
Language Total	NS	<.001[1]	NS	Test not given		
Mathematics	<.001[3]	.002[1]	NS	Test not given		
Vocabulary				NS	NS	NS
Comprehension				.004[2]	NS	NS
GRADE 7: 1978-79, 1979-80, 1980-81						
Parts of Speech	<.001[4]	<.001[1]	NS	<.001[4]	<.001[1]	NS
Sentences	<.001[4]	<.001[1]	NS	.002[4]	<.001[1]	NS
Language Total	<.001[4]	<.001[1]	NS	<.001[4]	<.001[1]	NS
Mathematics	<.001[5]	.009[1]	NS	Test not given		
Vocabulary	Test not given			<.001[6]	NS	NS
Comprehension	Test not given			<.001[7]	NS	NS
GRADE 8: 1979-80, 1980-81						
Parts of Speech	Test not given			.050[8]	<.001[1]	NS
Sentences	Test not given			NS	<.001[1]	NS
Language Total	Test not given			.026[8]	<.001[1]	NS
Mathematics	.012[8]	.024[1]	NS	.002[8]	NS	NS
Vocabulary	Test not given			.007[9]	NS	NS
Comprehension	Test not given			.001[8]	NS	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The mean achievement of the 1979-80 class and the mean achievement of the 1980-81 class was significantly higher than the mean achievement of the 1977-78 class.

[3] The mean achievement of the 1979-80 class was significantly higher than the mean achievement of the 1977-78 class and than the mean achievement of the 1978-79 class.

[4] The mean achievement of the 1980-81 class was significantly higher than the mean achievement of the 1978-79 group and than the mean achievement of the 1979-80 class.

[5] The mean achievement of the 1979-80 class and the mean achievement of the 1980-81 class was significantly higher than the mean achievement of the 1978-79 class.

[6] The mean achievement of the 1979-80 class was significantly higher than the mean achievement of the 1978-79 class. The mean achievement of the 1978-79 class and the mean achievement of the 1979-80 class was significantly higher than the mean achievement of the 1980-81 class.

[7] The mean achievement of the 1979-80 class and the mean achievement of the 1980-81 class were significantly higher than the mean achievement of the 1978-79 class. The mean achievement of the 1980-81 class was significantly higher than the mean achievement of the 1979-80 class.

[8] The mean achievement of the 1980-81 class was significantly higher than the mean achievement of the 1979-80 class.

[9] The mean achievement of the 1979-80 class was significantly higher than the mean achievement of the 1980-81 class.

comprehension while the 1979-80 class achieved significantly higher than the 1978-79 class. The difference between the mean achievement of the grade 7 boys and girls averaged across the three grades was not significant for reading vocabulary or comprehension.

The mean of the girls in the two grade 8 classes averaged across the two grades was significantly higher than the mean of the boys in parts of speech, sentences, language total, and mathematics. The mean of the last grade 8 class (1980-81) was significantly higher than the mean of the prior class in mathematics, based on each the fall and spring testings, and in parts of speech, language total, and reading comprehension, based on the spring testing. On the other hand, the mean of the 1979-80 grade 8 class was significantly higher than that of the 1980-81 grade 8 class in reading vocabulary. The sex difference for grade 8 was not significant for reading vocabulary or comprehension.

Achievements of Two Successive Longitudinal Cohorts

Longitudinal Cohort 1 consisted of 163 students (80 males, 83 females) who entered grade 6 of Webster Transitional School in 1977-78, remained in the school through grade 8 in 1979-80, took all of the achievement tests, and had mental ability scores. Longitudinal Cohort 2 had 166 students (76 males, 90 females). The students of Cohort 2 entered grade 6 one year later in 1978-79.

Table 4.4 gives the results of the tests of significance (ANOVA) for Cohort 1 and the post-hoc comparisons which were conducted when a difference significant at or beyond the .05 level was found. Table 4.5 gives the same results for Cohort 2.

The mean achievement of the girls, averaged across grades 6, 7, and 8, was significantly higher than the mean of the boys in parts of speech, sentences, and language total for both Cohorts 1 and 2. The mean achievement of the boys and girls was not significantly different in math, reading vocabulary, or reading comprehension.

The students of Cohort 1 and Cohort 2 gained significantly in parts of speech, sentences, language total, and mathematics between each successive testing. Both cohorts gained significantly in reading comprehension from the spring of grade 6 to the spring of grade 7 and from the spring of grade 6 to the spring of grade 8 but not from the spring of grade 7 to the spring of grade 8. The mean of Cohort 1 in reading vocabulary was not significantly different from one spring testing to the next while the mean of Cohort 2 in the spring of grade 6 was significantly higher than the mean in the spring of grade 7 and grade 8.

We may now turn to the three kinds of significant interactions for Cohort 1 and Cohort 2. The interactions are accounted for in the footnotes of Tables 4.4 and 4.5. Where a non-significant (NS) interaction involving gain by sex or gain by quarter was found, we conclude that the boys and girls gained equally or that each quarter of the

Table 4.4. Significant Differences (ANOVA $p \leq .05$) in Educational Achievement, Gain from Grade 6 to Grade 7 to Grade 8, and Post-hoc Comparisons of Gain by Quarter Interactions for Longitudinal Cohort 1: Webster Transitional School

	Sex	Gain	G X S	G X Q	G X S X Q
Parts of Speech	<.001[1]	<.001[2]	.024[4]	NS	NS
Sentences	.017[1]	<.001[2]	NS	.001[5]	.035[9]
Language Total	.001[1]	<.001[2]	NS	<.001[6]	.001[9]
Mathematics	NS	<.001[2]	NS	<.001[8]	NS
Vocabulary	NS	NS	NS	NS	NS
Comprehension	NS	<.001[3]	NS	.004[7]	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The gains for all possible pair-wise comparisons were statistically significant.

[3] The gains from Grade 6 spring testing to Grade 7 spring testing and from Grade 6 spring testing to Grade 8 spring testing were statistically significant.

[4] The girls gained more than the boys from the fall of Grade 7 to the spring of Grade 7 while the boys gained more from the fall of Grade 6 to the fall of Grade 7 and from the spring of Grade 7 to the spring of Grade 8.

[5] The gain from Grade 6 fall testing to Grade 7 spring testing was significantly more for Quarter 3 than the gain for Quarter 1. The gain from Grade 6 fall testing to Grade 8 spring testing was significantly more for Quarter 3 when compared to the gain for Quarter 1 and for Quarter 4 compared to Quarter 1.

[6] There were no statistically significant pair-wise comparisons.

[7] The gains from Grade 6 spring testing to Grade 8 spring testing were significantly higher for the highest quarter (Quarter 4) when compared to the second highest quarter (Quarter 3).

[8] The gain from Grade 6 fall testing to Grade 7 fall testing was significantly higher for Quarter 3 and Quarter 4 when compared to Quarter 1; the gain for Quarter 4 was significantly higher than the gain for Quarter 2. The gain from Grade 6 fall testing to Grade 8 fall testing was significantly higher for Quarter 4 compared to Quarter 1; the gain from Grade 7 fall testing to Grade 8 spring testing was significantly higher for Quarter 1 and Quarter 2 when compared to Quarter 4.

[9] No readily interpretable pattern of differential gains by quarters and sex was identified.

Table 4.5. Significant Differences (ANOVA $p \leq .05$) in Educational Achievement, Gain from Grade 6 to Grade 7 to Grade 8, and Post-hoc Comparisons of Gain by Quarter Interactions for Longitudinal Cohort 2: Webster Transitional School

	Sex	Gain	G X S	G X Q	G X S X Q
Parts of Speech	.001[1]	<.001[2]	NS	NS	NS
Sentences	.001[1]	<.001[2]	NS	.001[5]	NS
Language Total	<.001[1]	<.001[2]	NS	.014[6]	NS
Mathematics	NS	<.001[2]	NS	<.001[7]	NS
Vocabulary	NS	<.001[3]	NS	.011[6]	NS
Comprehension	NS	<.001[4]	NS	.022[6]	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The gains for all possible pair-wise comparisons were statistically significant.

[3] The Grade 7 spring and the Grade 8 spring testing mean achievements dropped significantly from the Grade 6 spring testing.

[4] The gains from Grade 6 spring testing to Grade 7 spring testing and from Grade 6 spring testing to Grade 8 spring testing were statistically significant.

[5] The gain from Grade 6 fall testing to Grade 7 fall testing was significantly greater for Quarter 4 when compared to Quarter 1. The gain from Grade 6 fall testing to Grade 7 spring testing was significantly greater for Quarter 3 and Quarter 4 when compared to Quarter 1. The gain from Grade 6 fall testing to Grade 8 spring testing was significantly greater for Quarter 4 when compared to Quarter 1.

[6] There were no statistically significant pair-wise comparisons.

[7] The gain from Grade 6 fall testing to Grade 7 fall testing was significantly greater for Quarter 3 and Quarter 4 when compared to Quarter 1. The gain from Grade 7 fall testing to Grade 8 spring testing was significantly greater for Quarter 1 when compared to Quarter 3 and Quarter 4.

class in mental ability gained equally. Only one of the 12 gain by sex interactions was significant. For Cohort 1 the significant gain by sex interaction in parts of speech is accounted for by the fact that the girls gained more than the boys from the fall of grade 7 to the spring of grade 7 while the boys gained more between the other times of measurement.

Nine of the 12 gain by quarter interactions were significant; however, in four instances the gains of no two pairs of quarters of the cohort were found to be significantly different (footnote 6). Moreover, as indicated in the footnotes for the other five significant interactions, relatively few of the many possible comparisons of the pairs of quarters at the several different times of testing were significant.

Comparison of the Average Achievement and the Gains Made by Two Longitudinal Cohorts

Analysis of covariance, with mental ability the covariate, was used in comparing the mean achievements and the gains of the two successive longitudinal cohorts. Table 4.6 gives the results of the tests of significance and the post-hoc comparisons of gains that were significant at or beyond the .05 level.

The overall achievement of the girls combined for the two cohorts and averaged across the four times of testing was significantly higher than the boys in parts of speech, sentences, language total, and mathematics while the differences were not significant in reading vocabulary or reading comprehension. (Recall that the difference in mathematics was not significant for either Cohort 1 or Cohort 2, separately.) Since there were no significant sex by cohort interactions, the preceding findings regarding the differences between the girls and boys apply to both cohorts.

Turning to the cohort comparisons, we find that the overall achievement of Cohort 2 was significantly higher than that of Cohort 1 in reading comprehension and in mathematics and not significantly different in the other four areas.

Relative to the significant gain by cohort interactions, the mean of Cohort 1 in reading vocabulary stayed about constant or increased somewhat while the mean of Cohort 2 dropped from grade 6 to grade 8 and again from grade 7 to grade 8. Although there was a significant gain by cohort interaction for reading comprehension, no difference between the two cohorts between any two corresponding times of measurement was significantly different. The same is true of the gain by sex by cohort interaction. In mathematics, Cohort 2 gained more than Cohort 1 from the fall of grade 6 to the fall of grade 7 and from the fall of grade 6 to the fall of grade 8.

Table 4.6. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement, Gain from Grade 6 to Grade 7 to Grade 8, Interactions, and Post-hoc Comparisons for Two Longitudinal Cohorts: Webster Transitional School

	Sex	Cohort	S X C	Gain	G X S	G X C	G X S X C
Parts of Speech	<.001[1]	NS	NS	<.001	NS	NS	.045[4]
Sentences	<.001[1]	NS	NS	<.001	NS	NS	NS
Language Total	<.001[1]	NS	NS	<.001	NS	NS	NS
Mathematics	.038[1]	.002[2]	NS	<.001	NS	<.001[5]	NS
Vocabulary	NS	NS	NS	<.009	NS	<.001[3]	NS
Comprehension	NS	.001[2]	NS	<.001	NS	<.040[4]	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The mean achievement for Cohort 2 averaged across all times of testing was significantly higher than the mean achievement for Cohort 1.

[3] Cohort 1 did not gain from Grade 6 spring testing to Grade 8 spring testing and from Grade 7 spring testing to Grade 8 spring testing. Cohort 2 dropped from Grade 6 spring testing to Grade 8 spring testing and from Grade 7 spring testing to Grade 8 spring testing.

[4] There were no statistically significant pair-wise comparisons.

[5] The gain for Cohort 2 from Grade 6 fall testing to Grade 7 fall testing and from Grade 6 fall testing to Grade 8 fall testing was significantly greater than Cohort 1.

Relationship of Achievement Results to the Focused Planned Changes, Non-specific Planned Changes, and Unanticipated Events

One purpose of this cooperative research was to relate the changes in student achievement from year to year to the planned changes that the school made annually in its school processes and structures and in its implementation of the three improvement strategies. To accomplish this, the prior results of the cross-sectional analyses of the achievements of the successive grade 6, grade 7, and grade 8 classes were used. The results pertaining to the achievements of the two longitudinal cohorts provide supportive information for the cross-sectional results. The rationale for using the results of the cross-sectional and the longitudinal analyses in this manner in drawing causal inferences regarding the effects of the improvement activities on student achievement was provided in Chapter 2. Also, as explained in Chapter 2, a significantly higher mean by a later class or cohort than an earlier class or cohort is regarded as a positive effect of the planned improvement activities; a significantly lower mean is regarded as negative, and a non-significant difference is regarded as neutral.

Table 4.7 provides a summary of the cross-sectional results pertaining to the successive grade 6 classes. The significant and non-significant differences are indicated, as well as the means and equivalent percentile ranks for two standardized reading tests. No conclusions are drawn related to the fall testing of the grade 6 students shown in Table 4.7 since these results reflect the students' achievement prior to entering grade 6 of Webster. Relative to the spring testing of grade 6, the classes of 1978-79 and 1979-80 achieved significantly higher than the class of 1977-78 in reading comprehension. The equivalent national percentile ranks were 60, 67, and 67 in 1977-78, 1978-79, and 1979-80, respectively. The difference between the classes was not significant for reading vocabulary, even though there was a slight gain in the percentile rank. This finding for grade 6 regarding comprehension is regarded as positive while that for vocabulary is considered neutral.

The summary for grade 7 is shown in Table 4.8. The means of the grade 7 class of 1980-81 were significantly higher than those of the two prior years in parts of speech, sentences, and language arts total. The means in mathematics of the 1980-81 and 1979-80 grade 7 classes were significantly higher than the mean of the 1978-79 class. The mean of each later grade 7 class was significantly higher than the mean of each earlier grade 7 class in reading comprehension. The grade 7 class of 1979-80 achieved significantly higher in reading vocabulary than the grade 7 class of 1978-79. However, the 1980-81 class achieved significantly lower in reading vocabulary than either prior class (the only negative finding for grade 7).

The findings for the grade 8 classes, summarized in Table 4.9, parallel those for grade 7. The 1980-81 class achieved significantly higher than the 1979-80 class in parts of speech, language total, fall and spring mathematics, and reading comprehension. The percentile rank in reading comprehension was 69 in 1979-80 and 80 in 1980-81. The mean of the 1980-81 class in reading vocabulary was significantly lower than the mean of the 1979-80 class. (The only negative finding for grade 8.)

The summary results for the two longitudinal cohorts are given in Table 4.10. The mean achievement of Cohort 2 was significantly higher than the mean achievement of Cohort 1 in mathematics and reading comprehension and not significantly different in the other areas.

This pattern of consistently higher achievements in 1979-80 and 1980-81 by the later grade 6, grade 7, and grade 8 classes as well as the higher mean achievement of the later longitudinal cohort is attribu-

Table 4.7. Summary of Findings Regarding Mean Achievement of Three Successive Grade 6 Classes and Percentile Ranks Corresponding to Adjusted Achievement Means: Webster Transitional School

	Comparison of Successive Classes					
	1978-79 vs 1977-78		1979-80 vs 1977-78		1979-80 vs 1978-79	
	Fall	Spring	Fall	Spring	Fall	Spring
Parts of Speech	NS	NA	NS	NA	NS	NA
Sentences	NS	NA	NS	NA	NS	NA
Language Total	NS	NA	NS	NA	NS	NA
Mathematics	NS	NA	S+	NA	S+	NA
Vocabulary	NC	NS	NC	NS	NC	NS
Comprehension	NC	S+	NC	S+	NC	NS
Average Student N	180					

	Adjusted Means and Equivalent Percentile Ranks								
	1977-78			1978-79			1979-80		
	Fall	Spring	%ile	Fall	Spring	%ile	Fall	Spring	%ile
Parts of Speech	80.73	NA		82.86	NA		87.21	NA	
Sentences	9.15	NA		7.48	NA		7.45	NA	
Language Total	90.61	NA		90.57	NA		94.92	NA	
Mathematics	44.85	NA		44.80	NA		59.56	NA	
Vocabulary	NC	54.27	67	NA	54.67	68	NA	55.29	70
Comprehension	NC	52.79	60	NA	54.53	67	NA	54.42	67

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.

NC No comparison was made since the fall testing did not reflect Webster educational program.

NA Not administered.

Table 4.8. Summary of Findings Regarding Mean Achievement of Three Successive Grade 7 Classes and Percentile Ranks Corresponding to Adjusted Achievement Means: Webster Transitional School

	Comparison of Successive Classes					
	1979-80 vs 1978-79		1980-81 vs 1978-79		1980-81 vs 1979-80	
	Fall	Spring	Fall	Spring	Fall	Spring
Parts of Speech	NS	NS	S+	S+	S+	S+
Sentences	NS	NS	S+	S+	S+	S+
Language Total	NS	NS	S+	S+	S+	S+
Mathematics	S+	NA	S+	NA	NS	NA
Vocabulary	NA	S+	NA	S-	NA	S-
Comprehension	NA	S+	NA	S+	NA	S+
Average Student N	196					

	Adjusted Means and Equivalent Percentile Ranks								
	1978-79			1979-80			1980-81		
	Fall	Spring	%ile	Fall	Spring	%ile	Fall	Spring	%ile
Parts of Speech	119.27	158.07		120.20	162.68		137.28	169.58	
Sentences	20.46	43.32		22.38	45.74		31.23	50.21	
Language Total	139.75	201.10		142.77	208.42		168.64	219.85	
Mathematics	100.89	NA		116.19	NA		125.95	NA	
Vocabulary	NA	54.25	67	NA	55.61	71	NA	52.53	60
Comprehension	NA	55.21	70	NA	56.76	75	NA	59.13	82

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.

S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.

NA Not administered.

Table 4.9. Summary of Findings Regarding Mean Achievement of Two Successive Grade 8 Classes and Percentile Ranks Corresponding to Adjusted Achievement Means: Webster Transitional School

	Comparison of Successive Classes 1980-81 vs 1979-80		Adjusted Means and Equivalent Percentile Ranks					
			1979-80			1980-81		
	Fall	Spring	Fall	Spring	%ile	Fall	Spring	%ile
Parts of Speech	NA	S+	NA	168.05		NA	172.03	
Sentences	NA	NS	NA	51.84		NA	54.55	
Language Total	NA	S+	NA	219.45		NA	226.69	
Mathematics	S+	S+	159.03	206.97		168.66	214.97	
Vocabulary	NA	S-	NA	55.32	71	NA	53.86	65
Comprehension	NA	S+	NA	54.87	69	NA	58.33	80
Average Student N	207							

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.

S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.

NA Not administered.

table primarily to the goal setting with individual students and for groups of students that was started in 1979-80 and continued in 1980-81. The goal setting was accompanied by planning and implementing more effective individual instructional programs in language arts, mathematics, and reading comprehension for individual students and for each group of students of each I & A Unit. Moreover, child-parent conferences were started on a systematic basis in 1979-80 and continued into 1980-81. These conferences included discussion of the child's educational program and also the child's progress or lack of it. The loss by the grade 7 and grade 8 classes in reading vocabulary from 1979-80 to 1980-81 cannot be accounted for in terms of planned changes or unanticipated events, especially since there was a significant gain in reading comprehension. The reading vocabulary curriculum of the school district, kindergarten through grade 10, apparently was

Table 4.10 Summary of Findings Regarding Mean Gain and Mean Achievement of Two Successive Longitudinal Cohorts: Webster Transitional School

	Cohort 1[1]				
	Fall Gr.6	Fall Gr.7	Spring Gr.7	Spring Gr.8	
Parts of Speech $\bar{X}$	84.36	123.55	161.61	171.39[3]	
Sentences $\bar{X}$	9.60	22.08	44.87	53.55[3]	
Language Total $\bar{X}$	93.34	145.47	206.33	224.99[3]	
Mathematics $\bar{X}$	46.79	105.46	162.43	208.68[3]	
	Spring Gr.6	Spring Gr.7	Spring Gr.8		
Vocabulary $\bar{X}$	55.36	54.81	55.76[4]		
Comprehension $\bar{X}$	54.14	55.94	55.36[5]		
	Cohort 2[2]				Cohort With Higher Average Achievement
	Fall Gr.6	Fall Gr.7	Spring Gr.7	Spring Gr.8	
Parts of Speech $\bar{X}$	83.86	124.08	163.29	172.39[3]	NS
Sentences $\bar{X}$	7.51	23.69	45.86	54.75[3]	NS
Language Total $\bar{X}$	91.36	147.80	209.15	227.25[3]	NS
Mathematics $\bar{X}$	44.48	119.84	170.12	215.08[3]	Cohort 2
	Spring Gr.6	Spring Gr.7	Spring Gr.8		
Vocabulary $\bar{X}$	55.80	55.65	53.46[6]		NS
Comprehension $\bar{X}$	55.35	58.87	57.87[5]		Cohort 2

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[1] The student N for the first three tests was 163 and for the last three it was 191.

[2] The student N of all six tests was 166.

[3] The gains for each comparison were statistically significant.

[4] The gain was not statistically significant.

[5] The gain from Grade 6 spring to Grade 7 spring, and the gain from Grade 6 spring to Grade 8 spring were statistically significant.

[6] Grade 7 spring and Grade 8 spring dropped significantly from Grade 6 spring.

not changed sufficiently in the middle school so as to be reflected in higher achievement by the later classes of grades 7 and 8.

We observed that there was a considerable reorganization of the teachers and students into I & A Units in 1979-80 due to a continued decline in student enrollment. Six teachers were new to the school in 1980-81. Furthermore, planning for a new program of performance-based education in reading, language arts, and mathematics started in 1979-80; and the entering grade 6 class of 1980-81 took a totally different set of tests from those of the last grade 6 class reported in the present analysis.

These unplanned events and nonfocused planned changes singly and together did not contribute to the higher educational achievements noted for 1979-80 and 1980-81. On the contrary, they may have been a deterrent to even higher achievement by the grade 6, 7, and 8 classes of 1979-80 and 1980-81 and also by the second longitudinal cohort.

Results Related to Student Attitudes

The IOX School Sentiment Index, Intermediate Level, was administered to the students of grades 6, 7, and 8 in April of each year 1978-79, 1979-80, and 1980-81. The test has 12 items designed to measure students' attitudes toward the teacher's mode of instruction, 12 items for teacher authority and control, 12 items for the teacher's interpersonal relationships with pupils, 10 items for learning, 11 items for social structure and climate, 12 items for peer, and 12 items for general attitudes toward education. The student responds True or Untrue to the 81 items. The Webster staff added items to measure the student's attitudes toward their teacher-advisor program.

The mean percent of the students of grades 6, 7, and 8 for each of the three years who checked the response keyed as favorable is given in Table 4.11 for the seven subscores. Since the students did not sign their names, it cannot be inferred that the same students who took the inventory in one grade also took it in the other two grades.

The grade 8 students had more favorable attitudes than the grade 7 students toward all aspects of the school situation except learning (equal), and more favorable than the grade 6 students, except toward the teacher-advisor program. The attitudes of the students of all three grades were considerably more favorable toward the teacher's mode of instruction, social learning and the climate of the school, and toward peers than toward other aspects of the school. Their attitudes were least favorable regarding learning, general attitudes toward school, and the teacher-advisor program.

Our primary concern is with the change in attitudes from year to year. As shown in Table 4.11, the overall mean attitude of the students of all three grades was about the same for the first two years but slightly lower in 1980-81 than in any prior year. The drop from 1979-80 to 1980-81 was considerable in only one of the eight areas,

Table 4.11. Mean Percent of Favorable Responses to School Sentiment Index for Three Successive Grade 6, Grade 7, and Grade 8 Classes: Webster Transitional School

	GRADE 6				GRADE 7				GRADE 8			
Subscale	78-79	79-80	80-81	X̄	78-79	79-80	80-81	X̄	78-79	79-80	80-81	X̄
Teacher Mode of Instruction	79	84	75	79.33	79	80	74	77.67	86	81	81	82.67
Teacher Authority and Control	71	65	58	64.67	61	60	55	58.67	69	65	65	68.33
Teacher Interpersonal Relationship with Student	67	68	66	67.00	65	66	61	64.00	71	71	72	71.33
Learning	64	65	60	63.00	61	59	57	59.00	60	61	56	59.00
Social Learning and Climate	76	79	66	73.67	79	78	66	74.33	83	80	70	77.67
Peer	71	78	75	74.67	79	79	76	78.00	85	83	84	84.00
General	61	60	62	61.00	66	58	60	61.33	68	63	65	65.33
Teacher-Advisor	61	67	60	62.67	58	64	57	59.67	61	63	60	61.33
Overall Mean	68.75	70.75	65.25		68.50	68.00	63.25		72.88	70.88	69.13	
N =	222	221	240		229	240	221		259	231	227	

namely, social learning and school climate. These less favorable attitudes toward social learning and school climate in 1980-81 cannot be accounted for. We may speculate that the reorganization of five of the eight I & A Units in 1980-81, new teachers becoming part of the teams in 1980-81, and the greater attention given by the teachers to increase the achievement of some students contributed to the decrease in the students' attitudes toward social learning and school climate in 1980-81.

Conclusions

One purpose of the present research was to determine the extent to which the Webster staff could implement the following improvement strategies: (a) arranging an appropriate total educational program of courses and other activities for each student, (b) arranging an appropriate instructional program in the subject fields of language, mathematics, and reading for each student each semester, and (c) setting goals for the students of each I & A Unit and planning and carrying out related improvement activities. The teachers were already arranging individual instructional programs for their students in language, mathematics, and reading in 1977-78. In 1978-79 the teachers started planning and monitoring individual programs of the students in a systematic manner. Each teacher served as an advisor to a group of students and assumed this responsibility. Goal setting in language and mathematics and carrying out related improvement activities were started by all of the I & A Unit teams in 1979-80. Accordingly, all aspects of the three improvement strategies were being implemented quite fully in 1979-80 and 1980-81.

Another objective of the research was to maintain an already satisfactory level of student achievement in language, mathematics, and reading from year to year and to raise achievement that was regarded as unsatisfactory. The later grade 6, grade 7, and grade 8 classes achieved as high or significantly higher than the first class in all areas tested except in reading vocabulary. The students of each of the two longitudinal cohorts gained significantly in all areas from one grade to the next, except in reading vocabulary. The achievements of Cohort 2 were significantly higher than those of Cohort 1 in mathematics and reading comprehension and not significantly different in the other areas. Based on these findings we conclude that the implementation of the improvement strategies, and particularly the goal-setting strategy, was effective in producing desired student outcomes except in reading vocabulary. Moreover, the attitudes of the students toward various aspects of their schooling and the average daily attendance remained relatively stable from year to year.

The negative finding related to reading vocabulary, according to the principal, was related to a fundamental deficiency in the language arts curriculum of the school district that extends from the primary school into the high school. Insufficient attention was given to reading vocabulary at all of the school levels. The loss of four teachers in 1979-80 due to lower student enrollment and the reorganization of six of the eight I & A Units probably affected student achievement negatively but this cannot be assured inasmuch as student achievement was generally higher in 1979-80 and 1980-81 than in the prior year.

CHAPTER 5

CARL SANDBURG JUNIOR HIGH SCHOOL

Cooperative improvement-oriented research was carried out with Carl Sandburg Junior High School for three years starting in 1977-78. The objectives of this research at Sandburg as well as the other schools were indicated in Chapter 2. The achievement areas selected for improvement at Sandburg were reading, language, spelling, and mathematics. Test information was gathered annually in science and social studies but the improvement strategies were not specifically directed toward these subjects. Maintaining or improving student attitudes was a second selected area.

There were four Instruction and Advisory (I & A) Units in 1977-78. The research and improvement activities were administered by the principal through meetings with the team of each I & A Unit. There was no educational improvement committee The remainder of this chapter is organized in the same manner as Chapters 3 and 4.

Staffing and Student Enrollment

Carl Sandburg Junior High School enrolls students in grades 7 and 8. It is the only junior high school in the Mundelein Elementary (K-8) School District, Mundelein, Illinois, a suburban district northwest of Chicago. There are four elementary schools in the district, but there is no senior high school. The high school of the Mundelein High School District is adjacent to Carl Sandburg Junior High. The community consists mainly of white collar, middle class Caucasians. The staffing of Sandburg, the student enrollment, and the average daily attendance for three successive years follow.

	77-78	78-79	79-80
Principal	1	1	1
Assistant Principal (part time)	1	1	1
Teachers	24	24	21
Counselor	1	1	1
Aides	2	3	4
Classified Staff	1	1	1
Learning Disability Teacher	1	1	1

	77-78	78-79	79-80
Learning Center Advisor	1	1	1
Part Time:			
School Psychologist	1	1	1
School Social Worker	1	1	1
Enrollment	380	346	322
Average Daily Attendance	96%	94%	94%

Data Gathered and Analysis of Data by the Sandburg Staff

Data regarding student outcomes were gathered annually. These data were summarized and analyzed by the staff and used in determining areas of possible improvements for the ensuing year. After the last data collection in 1979-80, the data on each individual student were analyzed by the project staff. The data gathering instruments, the schedule of administration, and the techniques employed by the Sandburg staff for analyzing the data are now outlined.

Otis-Lennon Test of Mental Ability

Administration: Grade 7 in May 1978, 1979, and 1980.

Analysis: Obtain the mental ability score from the test publisher's computer printout for the students of each of the school's four instruction and advisory units. Divide the students of each Instruction and Advisory Unit (I & A Unit) and total grade 7 and total grade 8 into quarters based on mental ability scores. Compute the mean mental ability of each quarter of each I & A Unit and of grade 7 and grade 8. Change the mean to the equivalent percentile rank using the test manual table(s).

Metropolitan Achievement Test: Word knowledge, reading, reading total, language, spelling, mathematics computation, mathematics concepts, mathematics problem solving, mathematics total, science and social studies.

Administration: Grade 7 and grade 8 in May 1978, 1979, and 1980.

Analysis: Using the computer printout from the test publisher, enter the standard achievement test scores of each student of each quarter of mental ability. Do this for each of the 11 areas tested. Compute the mean of each quarter in each area tested.

Derive an equivalent percentile rank using the appropriate test manual table(s). This permits comparison of the mean percentile rank in achievement of each quarter with its mean mental ability percentile rank.

Locally constructed student attitude survey: Five scores--School, teachers, learning, peers, self.

Administration: Grade 7 and grade 8 in December 1977, 1978, and 1979.

Analysis: Get average percent of students of each grade 7 and grade 8 who respond positively, negatively, and undecided to each item, to each subtest, and to total test.

Information from school records: Total enrollment as of September 1977, 1978, 1979, and percentage of average daily attendance for May 1977, 1978, 1979

Improvement Strategies Implemented by the Sandburg Staff

The improvement strategies worked out by the project director and the Sandburg staff were the same as those for the other schools as described in Chapter 2. One strategy was to arrange an appropriate educational program for the individual student each semester of the school year. Another strategy was to arrange an appropriate instructional program for each student enrolled in each course. The third strategy involved setting goals and planning and carrying out related improvement activities either to maintain or to raise the achievement of the students of each quarter of each grade in mental ability.

The Sandburg staff did not carry out individual educational programming in a formal way. Rather, this was done informally by the members of the instructional teams during the block of time they had the students. On the other hand, the staff attempted to refine instructional programming for the individual student that was already being implemented in 1977-78.

An annual evaluation of the school's educative processes was already being conducted in 1977-78 and it was continued each year thereafter. An external agency analyzed the scores of all the students on the Metropolitan Achievement Test and the Otis-Lennon Test of Mental Ability and presented an annual report with conclusions and recommendations to the district superintendent. The district superintendent shared the report with the school board members and with the principal.

The achievement test score focused on in this external evaluation was a growth score. Profiles of the mean annual growth of the grade 7 and grade 8 students in each area tested were available to the principal from this analysis. In addition to this information, the principal could develop profiles for individual students based on the information from the computer printouts provided by the test publisher.

During 1977-78 and prior years, the principal, with assistance of the counselor of Carl Sandburg Junior High, used the results of the external evaluation to identify students with a low growth score in any subject. These students and their scores were reported to the relevant academic teachers. The teachers tried to identify possible causes of the low growth and to remedy them.

The principal of Carl Sandburg Junior High School regarded the achievement of the students of both grade 7 and grade 8 in 1977-78 as good to excellent. He based his judgments on the conclusions provided by the external evaluator. He inferred from the growth scores provided to him that although the students were not achieving at grade level in some academic subjects upon entering grade 7, they gained or "grew" exceptionally well when in grades 7 and 8 at Sandburg.

In 1977-78, the previously described method of analyzing the data by the school staff was started. The principal and his staff, with consultation from the researcher, did their own summary and analysis of the test scores, using the test publisher's computer printouts of the student's scores. Table 5.1 gives the summary table that was prepared for the total grade 8 class of 1977-78.

We see from examining Table 5.1 that the mean achievement percentile rank in each subject field and the mean mental ability percentile rank of each quarter of the students are indicated. Examination of this table for grade 8 and another one for grade 7 enabled the principal and the relevant grade 8 and grade 7 teachers to make three assessments. (The principal and the teachers of the respective I & A Units had similar tables for their students and made the same assessments.) First, they estimated how well their educative processes in each subject field were working for each quarter of each I & A Unit and each grade. (The possibility that the test did not have a sufficiently high top for some of the top quarter students, particularly those of grade 8, was recognized.) Second, they compared how each quarter of the students in mental ability achieved across the 11 areas. Third, they estimated how well the students of each I & A Unit of grade 7 and of grade 8 had achieved in the different areas that were tested.

Based on these assessments, the principal and the staff of each I & A Unit developed plans to maintain or to raise the achievement level of the students of each mental ability quarter. They concentrated on maintaining or improving the mean achievement of the students of each I & A Unit in the areas of language, math, reading, and spelling. This step was implemented to a minor extent for the grade 7 and grade 8 classes during the second semester of 1978-79 and more completely in 1979-80. However, even in 1979-80, concrete goals in terms of the same or a higher level of achievement in relation to mental ability were not set in any subject field for all mental ability quarters of grade 7 or grade 8. As we shall see later, goals were

Table 5.1 Quarters of Grade 8 Class in Mental Ability and Their Corresponding Mean Standard Scores and Mean Percentile Ranks, Based on Metropolitan Achievement Test, Advanced; and Mean Mental Ability and Corresponding Mean Percentile Ranks of Each Quarter Based on Otis-Lennon Mental Ability Test, Administered 5/78: Carl Sandburg Junior High School

	LOCAL FOURTHS AND MEAN										
	Local Highest 1/4		Local Second 1/4		Local Mean			Local Third 1/4		Local Lowest 1/4	
	National		National		National			National		National	
Achievement Test	SS	%ile	SS	%ile	SS	SD	%ile	SS	%ile	SS	%ile
Word Knowledge	110	88	101	66	97	12.59	58	93	50	84	26
Reading	111	82	101	66	96	15.23	56	90	40	81	23
Total Reading	113	84	103	70	98	14.13	60	92	44	84	26
Language	116	88	106	72	99	14.76	56	96	48	79	13
Spelling	112	88	105	72	101	12.80	58	97	48	90	24
Math Computation	113	84	102	54	99	13.75	40	93	24	87	17
Math Concepts	105	75	95	52	91	13.07	40	85	24	79	14
Math Problem Solving	114	80	104	62	99	15.61	44	93	31	86	18
Total Math	117	80	106	54	101	13.92	42	95	26	88	12
Science	111	84	100	58	99	11.14	54	96	44	88	24
Social Studies	115	84	103	62	99	14.22	52	95	44	86	18
IQ Score and National Percentile	123	92	110	73	105	14.28	62	100	50	87	21

Local fourths are computed for the total number of Grade 8 students who were tested.

SS = The standard score obtained from the Test Manual. SS = The Grade 8 students' scores changed to standard scores.

%tile = The percentile obtained from the Test Manual that is equivalent to the SS.

SD = Standard Deviation (noted only for the Local Mean).

set in more general terms such as raising the achievement level of the students in math problem solving.

Description of Carl Sandburg Junior High School as of 1977-78

The description of Carl Sandburg Junior High School as it was functioning in 1977-78 starts with the school's philosophy and concludes with an indication of its research activities. This description provides essential information for relating the student outcomes of 1977-78 to Sandburg's organization structures and processes and improvement strategies of 1977-78 and also to the planned improvements that were made each year thereafter.

Philosophy

The philosophy of Carl Sandburg Junior High School is based on objectives designed to provide an educational program that will:

Prepare students for effective participation in society through a program of continuous individualized instruction.

Enable each student to develop study techniques that will benefit him/her in later grades.

Help the student to develop the ability to make wise decisions in later life.

Promote in each student a sense of fair play in his/her relationship with others, and a respect for others regardless of race, creed, religion, or national origin.

Develop in the student a realization and appreciation of his/her own abilities and the abilities of others.

Stimulate in each individual a desire to seek knowledge, to observe, to question, and to delay reaching a decision until evidence of an appropriate kind has been produced.

Help the student recognize interrelationships of various fields and to be able to apply common concepts.

Promote social, intellectual, cultural, emotional, and moral growth, as well as physical health.

Help the student develop a reasonable, self-disciplined personality capable of recognizing and displaying reliable leadership and fellowship.

Develop an awareness in the student of the need for guidance in planning his/her personal, educational, and vocational growth.

Instill a respect for authority and discipline with the understanding that change is possible through a democratic process.

Promote exploration into various areas of interest which will develop profitable use of leisure time.

Instill pride in self, school, community, and country.

Help the student realize that his/her development is the ultimate aim of education.

Administrative Arrangements

There are two administrators, the principal and an assistant principal. The principal is responsible for the daily operation of the school and for instructional supervision, improvement, and evaluation.

The assistant principal is a certified teacher who also teaches. She has two 45-minute periods of time released from her teaching duties to carry out her administrative work. Her major administrative duties are to monitor student attendance and to act in behalf of the principal during his absence from the building.

The groups through which the principal and assistant principal administer the school are an administrative team consisting of the principal and assistant principal; four academic teams of four teachers each; one specialist team of teachers; four departments that include language arts, mathematics, science, and social studies; the teachers of each grade 7 and grade 8; and the total faculty. Instructional decision making is shared by the administrators and teachers in meetings of these groups and there is face-to-face communication between the teachers and administrators dealing with administrative and instructional matters.

In carrying out his administrative responsibilities, the principal meets with groups as follows: (a) the assistant principal daily from 8:00 to 8:30 a.m., (b) each academic team of teachers and the specialist team once per week, (c) the chairpersons of the four academic departments once per month, and (d) the 7th grade teachers and the 8th grade teachers in alternating months.

The school does not have an Instructional Improvement Committee or any similar group that works with the principal and assistant principal on schoolwide matters. Instead, the principal meets regularly with the various groups of teachers and other staff as indicated in the preceding paragraph.

A System-wide Program Committee (SPC) meets monthly. It is composed of two teachers and one administrator from each of the four elementary schools and the Carl Sandburg Junior High School. The district superintendent chairs the monthly meetings of the SPC. The activities of the SPC include eliciting and receiving the suggestions made by teachers of the school district and dealing with curriculum and other program matters. Ad hoc committees are formed by the SPC to work on particular curricular issues. Members of the ad hoc committees are either regular members of the SPC or staff members of the district schools. The SPC as a group receives and acts upon the reports from the committees. If approved, the reports are submitted to the superintendent, who acts directly on them or makes recommendations to the Board of Education.

Organization for Instruction and Student Advising

The staff of 24 teachers is organized into four academic teams, with a total of 16 teachers, and one specialist team of 8 teachers. Ninety to 100 students are assigned to each of the four academic teams, and each group of teachers and students in called an Instruction and Advisory Unit (I & A Unit). Each academic team of teachers carries out the instruction in language arts, including literature and reading, mathematics, social studies, and science. Each team has one common class period each day for team planning and for dealing with other matters pertaining to instruction, evaluation, student advisement, etc.

The specialist team is composed of the teachers of physical education (two teachers), industrial arts (one teacher), art (one teacher), music (one teacher), home economics (one teacher), the learning center (one teacher), the coordinator of the school's Title I program (one teacher), the guidance counselor, and the learning disability teacher. A school psychologist and a school social worker, who are assigned also to the elementary schools part time, occasionally meet with the specialist team and the academic team. The specialist teachers teach the classes in their own subject fields and serve as resource persons on an ad hoc basic to the academic teams. The team of specialist teachers and other staff spends a 45-minute period as a group each day in team planning and in dealing with other matters concerned mainly with instruction, evaluation, and student conduct.

Each academic department has a chairperson who is elected by the department members. Department chairpersons and the team leaders receive additional pay. Teachers act as informal advisors to the students of their I & A Units at any time during the day that they have the students for instruction, but more often this occurs during the teacher's planning period. No other time is set aside for student advisement by the teachers. The guidance counselor, who does no teaching, consults with the teachers on student personnel matters and also counsels individual students.

Students are assigned to the I & A Units by the principal and guidance counselor prior to the beginning of the school year. Teachers' judgments regarding each student's achievements and personal-social characteristics as well as the results of standardized achievement testing are used in making the assignments. The assignment process assures that each I & A Unit has a representative one-half of the students of the grade. The assignment yields maximum heterogeneity according to levels of achievement, sex, and personal-social characteristics.

Pattern of Curriculum and Instruction

Courses. All students in grade 7 and in grade 8 take certain courses throughout the two school years, while other courses, also required, are taken during certain semesters only. Students may elect to take certain of the courses in a particular semester; however, there are no elective courses.

In accordance with school policies, all grade 7 and grade 8 students take each of the following for one period daily during both semesters: language arts, mathematics, science, and social studies. The language arts includes literature, spelling, and grammar throughout the year and developmental reading for nine weeks of the year. The students of each grade take physical education for one period daily during one semester and during another semester they take nine weeks each of home economics and industrial arts. During the school year they take nine weeks of each of the following for one period daily: career education, consumer education, developmental reading, and health. The seventh class period is a lunch period.

There is a remedial program in reading for about 70 students who are diagnosed as having serious reading problems but who are not included either as learning disability or Title I students. These students are placed in a reading skills laboratory and have a full-time reading specialist as their reading teacher. Assignment to this program is based on the reading skills and comprehension subtests of the Metropolitan Achievement Test, the Gates-MacGinitie Reading Test, and the evaluation and observations made by 6th grade teachers.

Students who are diagnosed as having serious problems in mathematics are placed in a Title I mathematics skills improvement program. The same Title I reading specialist also teaches these students mathematics. Students are assigned to this program based on the results of the math computation test of the Metropolitan Achievement Test.

Slightly more than 100 different minicourses were offered between March 13-23 of 1977-78, the two weeks prior to Easter.

Instructional materials. The teachers in the academic subject fields and in most of the special fields use published learning programs (textbook, audiovisual material, tests, etc.) that have been prepared to facilitate individualization. Most unipacs prepared by the teachers are geared to this primary set of published curricular materials. However, other published and locally developed materials are also referred to in the unipacs to enable the teachers to meet the needs of students of different interests, achievement levels, and learning styles.

Printed and audiovisual materials of many kinds are obtained by each of the academic departments, based on the recommendations of the members of the academic teams. There is also an exchange agreement among the resource centers of the schools of the Mundelein School District which enables teachers to select from a wide array of instructional materials.

All courses are organized into learning units of two weeks length for which there are related unipacs to guide learning and instruction. The unipacs are written by the teachers of the school. The school district provides funds for teachers to participate in summer curriculum projects. Besides writing new unipacs during the summer, teachers also revise their current unipacs. Most unipacs are revised every two to three years:

Unipacs are written to include the following items:

> one or more specific instructional objectives to be attained by the student.
>
> materials to be used by the teachers and students.
>
> activities the student engages in to attain the objectives.

Extracurricular activities. Extracurricular activities include intramural athletic activities, interscholastic athletic activities and the related activities such as cheerleading, publications including a yearbook and a newspaper, and a science club. About 44% of the boys and girls participated in extracurricular activities during 1977-78.

Programs for exceptional students. A Title I program is functioning that includes an average of 60 students of grade 7 and grade 8 (combined) per year, approximately 18% of the total student body. Roughly half of these students are in the program during each semester of the year. They receive instruction in reading and other language arts, mathematics, or both as part of the Title I instruction. This instruction is typically provided to groups of 12. Tutoring is arranged for some Title I students in any subject. A Title I director, who is also a teacher, is assisted by a full-time aide in providing the Title I classroom instruction and tutoring.

Twenty to 25 students of grade 7 and grade 8 (combined) are in a program for students with learning disabilities. A full-time learning disability teacher and an aide provide the special instruction for these students. They are mainstreamed as early and as much as possible in all subject fields. Students with behavioral disorders and those of low mental ability are assigned to other schools of the county.

Educational Programming for the Individual Student

A total educational program of course work and other educational activities is planned systematically each semester only for students with exceptional education needs. However, individual instructional programming is implemented in each of the academic subjects.

The academic teachers use unipacs that include instructional objectives and related assignments and activities to achieve each objective. Each student's instructional program in each subject includes attainment of the required unipac objectives. Enrichment in depth and in breadth is provided for students who achieve the objectives early. Extra help and out-of-class assignments are given to those who have difficulty.

The unipac objectives for grades 7 and 8 in language arts, reading, and mathematics are drawn from a set of objectives that have been developed for kindergarten through grade 8 of the district. The middle school staff has prepared the unipac objectives in science and social studies. Each student's instructional program in each academic subject, as well as the postassessment and the A-F letter grades assigned to students in the subjects, are related directly to these objectives.

Assessment of the student's entering achievement characteristics occurs during the first week of school. It is based on the results of teacher-constructed objective-referenced tests administered during the first week of school, the results of standardized achievement testing in the various subject fields during the preceding school year, and teacher judgments regarding the student's achievements and personal-social characteristics during the prior year of school. Assessment of the entering achievement level of students is done at the beginning of learning units in mathematics. Relatively little preassessment of any kind occurs in the applied arts.

All students first work toward attaining the required instructional objectives that are included in each unipac. The extent to which instruction is adapted to each student's entering achievement level and learning styles varies among the subject fields and teachers' preferences. The adaptations use different amounts of time for instruction and different kinds of instructional materials and individual and group activities. However, individual assignments are used much more than whole-class and small-group activities in most learning units of most academic subjects. In some subjects different materials are available for students to achieve the same objectives.

In the fall, the principal alerts all academic teachers to the students who are below grade level in reading achievement. The teachers give attention to those students by finding more activities that do not require reading to aid them in understanding concepts and principles, and they also try to help the student to develop better reading skills.

Postassessment is related directly to the instructional objectives stated in the unipac. The predominant assessment procedure is the paper-and-pencil test, but work samples, performance tests, and teacher observations are also used, depending on the subject field and the teacher's preference.

Approximately 90-95% of the students attain the objectives at a sufficiently high level to be given an A, B, C, or D by the teacher. Students who master the objectives at a rapid rate and get As or Bs do not proceed to the objectives of the next unit. Instead, they work on enrichment activities. Approximately 5-10% of the students do not attain the 80% mastery criterion on the unipac tests. Nonetheless, these students proceed with other students to the next unit. Tutoring by the teacher, special assignments. and other forms of teacher help are given to these students to aid them master the objectives.

Community Learning and Career Education

Field trips are used extensively in career awareness and exploration. Community resource persons come into the school and make presentations to different classes during the year. Career-oriented minicourses, especially those in the spring, give students the opportunity to observe work activities in factories and service organizations of the community.

Evaluation Activities

Published tests are used at the beginning of grade 7 to determine appropriate placement of students in reading and math. The Gates-MacGinitie Reading Test is administered to all incoming 7th graders for the purpose of assigning students to the reading skills laboratory. The Metropolitan Mathematics Test is used for assignment to the mathematics skills laboratory.

Evaluation of student progress by the teachers includes teacher-constructed paper-and-pencil tests, teacher observations, performance tests, and work samples. The evaluation procedures are related directly to the objectives included in the unipacs. Letter grades of A-F are assigned to students based on their attainment of the objectives of each learning unit. Each learning unit contains a listing of possible activities and a corresponding number of quality points that a student will receive for completing each activity. A scale indicates to the student the number of points needed for an A, B, C, and D.

The primary instruments used in the annual evaluation of student achievement are the Otis-Lennon Mental Ability Test and the Metropolitan Achievement Test. The complete Metropolitan Achievement Test is given each year to all 7th and 8th graders, and the following subscores are obtained: word knowledge, reading, total reading, language, spelling, math computation, math concepts, math problem solving, total math, science, and social studies. (An external evaluation agency uses these data in preparing an annual report to the superintendent of schools as was described earlier in this chapter.)

Program of Home-School-Community Relations

Communication with parents is accomplished through newsletters, parent-teacher conferences, interim 4-5 week progress reports, and telephoning. No formal arrangements are established for involving parents in any aspect of the educative process; however, the parents of 140-150 students involved in athletics function as an athletic parents' group.

Internal and External Support Arrangements

The teachers of each I & A Unit are provided a daily, common preparation period which they use for team planning related mainly to curriculum, instruction, evaluation, and advising. Other periods are arranged for the principal to meet weekly with the specialist team and with each of the four academic teams and monthly with the four department chairpersons.

Representatives of Carl Sandburg also meet with the district System-wide Program Committee for the purpose of reviewing the district curriculum, assuring articulation of the curriculum between the elementary schools and the junior high school, and dealing with other program matters affecting the elementary schools, the junior high school, or both. Departmental committees meet regularly with high school and junior high school personnel for similar purposes.

Continuing Research and Development

In cooperation with the Wisconsin Center for Education Research, a comprehensive program of cooperative educational improvement research started in 1977-78 and continued through 1979-80. The main purpose of the research from the standpoint of the school was to maintain or to raise student achievement in language, math, reading, and spelling. The standardized achievement test battery was changed in 1980-81 and the data from the new battery were not analyzed by the project.

Non-specific Planned Changes, Unplanned Events, and Focused Planned Changes

For each of the three years of the study, the occurrences of any of the three following kinds of change are outlined: (a) unplanned events that in the judgment of the principal might have influenced student achievement or attitudes, (b) non-specific planned changes related to some aspect of the school program that were not directed toward raising educational achievement in one of the 11 areas tested or students attitudes, and (c) planned changes focused on the improvement of student achievement or attitudes.

1977-78

The research procedures and improvement plans were formulated. Procedures already in place in 1977-78 for identifying and providing for students who were low in reading and math as indicated in the 1977-78 description of the school were continued.

1978-79

Unplanned event

None

Non-specific planned change

A large amount of noise resulted from the construction of a new gym and remodeling of the cafeteria and music room. The remodeling started in September 1977 and continued into December of the 1978-79 school year.

A regularly scheduled intramural program was started for grades 7 and 8, when the new gym became available, to replace the less formal program of 1977-78. Continued into 1979-80.

Physical education was offered daily for both semesters, rather than for one semester.

A federally-funded Title IV program was started to enable students to visit community organizations and facilities. Continued into 1979-80.

A survey was conducted to determine the possibility of increasing the achievement of the highest quarters of grade 7 and grade 8 in science. The science teachers were given released time to review the present science program, visit other schools, meet with textbook representatives, etc.

An attempt was made to increase achievement of the lowest quarter of the grade 7 students in social studies by revising the social studies unipacs to include more materials and activities appropriate for low ability students. Continued into 1979-80.

Focused planned change

A staff development program was conducted to develop a better understanding by the staff of middle-school adolescents.

A Sandburg Parent Association was formed, and each academic team tried to use more effective communication techniques with parents, i.e., letters, phone calls, and teacher-parent conferences, to improve school/parent relationships.

A remedial program was started in reading for the grade 7 and grade 8 students identified by the I & A teams as needing additional help in reading (about 3% of the total). Continued into 1979-80.

A program was started for grade 7 and grade 8 students gifted in reading, about 20% of the student body. Continued into 1979-80.

A remedial program and a program for gifted students were started in mathematics and language arts.

An attempt was made to raise the reading achievement of the grade 7 and grade 8 students whose achievement was below expectancy in terms of mental ability by increasing the student's motivation and arranging better methods and materials. One teacher was funded during three weeks of the summer of 1978 to develop materials and activities to be used with these students. A beginning change was made from almost exclusively individual assignments and self-pacing to some small group and whole class instruction. Program continued into 1979-80.

More time was allocated to instruction and additional instructional materials were used to increase the achievement of the two quarters of the students of middle mental ability of grade 7 and grade 8 in word knowledge and spelling. Continued into 1979-80.

Instructional materials for the above average students were changed to raise the achievement of the two highest quarters of students of grade 8 in math problem solving and concepts. The students of both grade 7 and grade 8 were organized for instruction into four ability groups based on their math achievement test scores and teacher judgment. Some small-group and whole-class instruction was started to replace the almost exclusive use of individual assignments. Continued into 1979-80.

1979-80

Unplanned event

A school district committee, at the instigation of citizens, was formed and met throughout the school year to consider closing either an elementary school or their only junior high school and going back to a K-8 elementary school plan. The committee recommended continuation of the present junior high school.

Lower enrollment resulted in three fewer academic teachers being employed by the school than in 1978-79. As a result the academic teachers and students were organized into three I & A units rather than four: one combined grade 7 and grade 8, one grade 7, and one grade 8.

Both grade 8 language arts teachers resigned at the end of 1978-79 and were replaced in 1979-80.

One grade 8 social studies teacher took a one-year leave of absence and was replaced with a substitute teacher.

Non-specific planned change

An alternative class of 10 to 15 students who were having difficulty in their mainstreamed classes was formed.

A grade 8 elective program was started in art, music, home economics, and shop, and mini-courses were offered in science and social studies. These electives and minicourses replaced the 1977-78 requirements in these areas.

An alternative educational program was started in reading and math for 15 grade 8 students identified as potential dropouts.

Focused planned changes to increase academic achievement or student attitudes: (The recommended improvement strategy related to goal setting for groups of students was implemented in reading, language, spelling, and math by setting goals stated in general terms rather than concretely in terms of percentile rank related to mental ability.)

A goal was set to increase the total reading achievement of each student whose achievement was one or more grade levels below actual grade placement and to increase the mean reading achievement of each quarter of the grade 7 and grade 8 classes for which the reading achievement percentile rank was below the mental ability percentile rank. The means employed included a more effective arrangement of instructional methods, materials, and instructional time.

A goal was set to increase student achievement in spelling and language. The amount of time given to spelling for both grade 7 and grade 8 was doubled and that for language was increased by one-fifth as part of a newly developed unified arts program that was carried out for one class period per day.

A goal was set to increase the achievement of all quarters of grade 7 in math problem-solving. A 4½ week math problem-solving course was developed as part of a newly developed unified arts program for grade 7, and it was required of all grade 7 students (preparatory activities were carried out by teachers in the summer of 1979).

An attempt was made to increase the achievement of the highest quarter of the students of grade 8 in math problem solving and math concepts by continuing the activities started in 1978-79 and by offering advanced placement math courses in adjoining Mundelein High School or through independent study in algebra at Sandburg for all students scoring two or more years above grade level.

Results Related to Educational Achievement

The results from the three successive years of data gathering are presented in this part of the chapter. Standard scores from the achievement tests and IQ scores from the mental ability tests are reported. Only the results of tests of significance are indicated in most of the summary tables that follow. The original tables in which means and standard deviations are given are listed in the Appendix and are reported in Klausmeier, Serlin, and Zindler (1982).

Participating Students

Table 5.2 gives the total number of students, the number of boys and girls, and the mean mental ability for the three grade 7 classes

Table 5.2. Total Number of Students of Grades 7 and 8 and Their Mean Mental Ability: Carl Sandburg Junior High School

	1977-1978			1978-1979			1979-1980		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
Grade 7									
Total	181	105.38	12.47	153	106.30	12.49	158	109.24	13.17
Male	102	105.21	12.59	80	105.26	13.56	79	110.14	11.98
Female	79	105.61	12.38	73	107.44	11.13	79	108.34	14.28
Grade 8									
Total	191	105.17	14.31	168	106.13	11.96	160	105.10	13.33
Male	107	104.80	13.41	93	105.83	11.74	87	103.80	15.19
Female	84	105.64	15.46	75	106.51	12.31	73	106.64	10.61

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[1] This N equals all the students of each class who took the IQ test. From 0% to 5% of this N did not take one or more achievement tests.

and the three grade 8 classes. Three hundred seventy-two students took the mental ability test in 1977-78, 321 in 1978-79, and 318 in 1979-80. The total number of students enrolled in the same years was 380, 346, and 322. The number of boys was greater than the number of girls in each class each year until 1979-80 when the number of boys and girls in grade 7 was the same.

Two points regarding the mean IQ (shown in Table 5.2) may be made. First, the mean IQ of the grade 7 class of 1979-80 (109.24) is somewhat higher than the mean of the two earlier classes (105.38 and 106.30), whereas the variation from year to year is smaller for the grade 8 classes. Second, the difference between the mean IQ of the boys and girls varies from year to year, e.g., in 1979-80 grade 8 boys = 103.80 and grade 8 girls = 106.64.

This information is presented to provide a description of the student population. It is not discussed further in this chapter.

Comparison of Achievements of Three Successive Grade 7 Classes

The Metropolitan Achievement Test Battery Form F, 1971, and the Otis-Lennon Mental Ability Test, 1967, Form J, were administered to the grade 7 and the grade 8 students at one-year intervals in May 1978, May 1979, and May 1980.

For grade 7 the number of students taking any one of the achievement tests ranged from 172 to 178 (males 96-100, females 76-78), in 1977-78, from 149 to 152 (males 78-80, females 71-72) in 1978-79, and 155 to 158 (males 78-79, females 77-79) in 1979-80. The mean IQ of the boys and girls of each class and the mean IQ of the total classes varied somewhat from year to year. Accordingly, analysis of covariance, with IQ the covariate, was used to compare the mean educational achievements of the three successive grade 7 classes. Table 5.3 summarizes the findings regarding the significant differences for class, sex, and for class x sex interactions.

The difference in achievement among the three grade 7 classes was significant in six of the areas tested but not in word knowledge, reading, and reading total. Regarding the six areas in which the difference among the three classes was significant, the post-hoc comparisons showed that the grade 7 class of 1978-79 did not achieve significantly higher than the baseline grade 7 class of 1977-78 in any area. However, the 1979-80 class achieved significantly higher than the baseline class of 1977-78 in spelling, math computation, math concepts, and math total and also significantly higher than the class of 1978-79 in spelling, math computation, and math total. We observe in Table 5.3 that the difference among the three grade 7 classes in language and math problem solving was significant but that the post-hoc comparisons that involved only pairs of classes were not. However, the mean of the 1979-80 grade 7 class in these two areas was significantly higher than the mean of the first two grade 7 classes combined.

Table 5.3 Significant Differences (ANCOVA $p \le .05$) in Educational Achievement and Post-hoc Comparisons for Three Successive Grade 7 Classes: Carl Sandburg Junior High School

	Main Effects			Post Hoc Comparisons		
	Class(C)	Sex (S)	C X S Interaction	1978-79 vs 1977-78	1979-80 vs 1977-78	1979-80 vs 1978-79
Word Knowledge	NS	NS	NS			
Reading	NS	.044[3]	.011[5]			
Reading Total	NS	NS	NS			
Language	.047[4]	<.001[3]	NS	NS	NS	NS
Spelling	.009	<.001[3]	NS	NS	Sign[1]	Sign[2]
Math Computation	<.001	.002[3]	NS	NS	Sign[1]	Sign[2]
Math Concepts	.013	NS	NS	NS	Sign[1]	NS
Math Problem Solving	.042[4]	NS	NS	NS	NS	NS
Math Total	.001	.012[3]	NS	NS	Sign[1]	Sign[2]

[1] The Grade 7 Class of 1979-80 achieved significantly higher than the Grade 7 Class of 1977-78.

[2] The Grade 7 Class of 1979-80 achieved significantly higher than the Grade 7 Class of 1978-79.

[3] The females achieved significantly higher than the males.

[4] The adjusted mean was higher for 1979-80 than for the two prior years combined, although no pairwise contrast between years was significant.

[5] The mean achievement of the females of the two later classes was higher than the mean of the males but about the same for the first class.

The mean achievement of the girls, averaged across the three grade 7 classes, was significantly higher than the mean of the boys in reading, language, spelling, math computation, and math total. The differences between the boys and girls were not significant in word knowledge, reading total, math concepts, and math problem solving.

A significant class x sex interaction was found for reading. The mean achievement of the females of the later two classes was higher than the mean of the males but about the same for the first class.

Comparison of Achievements of Three Successive Grade 8 Classes

The number of students taking any one of the achievement tests ranged from 184 to 188 (males 102-106, females 82-83) in 1977-78, from 162 to 165 (males 90-93, females 72-74) in 1978-79, and from 157 to 160 (males 85-87, females 72-73) in 1979-80. Table 5.4 indicates the significant differences and, where the difference among the means was significant at or beyond the .05 level, the post-hoc comparisons.

The difference in achievement among the three grade 8 classes was significant only in the four math areas. The grade 8 class of 1978-79 achieved significantly lower than the grade 8 class of 1977-78 in math problem solving. The grade 8 class of 1979-80 achieved significantly higher than the baseline class of 1977-78 in math computation and in math total and significantly higher than the class of 1978-79 in math computation, math concepts, math problem solving, and math total.

The mean achievement of the girls, averaged across the three grade 8 classes, was significantly higher than the mean of the boys in language, spelling, and math computation. The sex difference in achievement was not significant in any other area. There were no significant class by sex interactions.

Table 5.4 Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement and Post-hoc Comparisons for Three Successive Grade 8 Classes: Carl Sandburg Junior High School

	Main Effects			Post Hoc Comparisons		
	Class(C)	Sex (S)	C X S Interaction	1978-79 vs 1977-78	1979-80 vs 1977-78	1979-80 vs 1978-79
Word Knowledge	NS	NS	NS			
Reading	NS	NS	NS			
Reading Total	NS	NS	NS			
Language	NS	<.001[4]	NS			
Spelling	NS	<.001[4]	NS			
Math Computation	.001	.034[4]	NS	NS	Sign[2]	Sign[3]
Math Concepts	.005	NS	NS	NS	NS	Sign[3]
Math Problem Solving	.001	NS	NS	Sign[1]	NS	Sign[3]
Math Total	<.001	NS	NS	NS	Sign[2]	Sign[3]

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[1] The Grade 8 class of 1978-79 achieved significantly lower than the Grade 8 class of 1977-78.

[2] The Grade 8 class of 1979-80 achieved significantly higher than the Grade 8 class of 1978-79.

[3] The Grade 8 class of 1979-80 achieved significantly higher than the Grade 8 class of 1978-79.

[4] The females achieved significantly higher than the males.

Achievement of Two Successive Longitudinal Cohorts

Longitudinal Cohort 1 consisted of 136 students (78 males, 58 females) who entered grade 7 of Carl Sandburg Junior High School in 1977-78, remained in the school through grade 8 in 1978-79, and took all of the achievement tests and the IQ test in 1977-78. Longitudinal Cohort 2 had 134 students (71 males, 63 females) who entered grade 7 one year later in 1978-79. It is noted that some students who attended school both years did not take all the tests and accordingly were not included in the respective longitudinal cohorts.

Table 5.5 provides the summary results of the ANOVA for each cohort. Significance at or beyond the .05 level is indicated.

The mean achievement of the Cohort 1 girls, averaged across the two times of testing, was significantly higher than the mean of the boys in language. The differences between the boys and girls were not significant in the other eight areas.

The students of Cohort 1 made a significant gain in all nine achievement areas from grade 7 to grade 8. There were no significant gain by sex interactions, indicating that the boys and girls gained equally from grade 7 to grade 8 in all nine areas. There were no significant gain by quarter interactions; the four quarters of the students in mental ability gained equally from grade 7 to grade 8 in all nine achievement areas.

Turning to Cohort 2, we find that the mean achievement of the girls was higher than that of the boys in language and spelling. The other sex differences were not significant.

The students of Cohort 2 made a significant gain from grade 7 to grade 8 in all nine areas. Only two of nine gain by sex interactions were significant. The significant interactions in reading and reading total are accounted for by the fact that the girls gained more than the boys from grade 7 to grade 8. One of the nine gain by quarter interactions was significant. The mean gain in spelling of the lowest quarter was higher than the gain of the two highest quarters. One of the nine gain by sex by quarter interactions was significant, namely, for reading. The males of Quarter 3 gained significantly more than the males of Quarter 1 (lowest quarter), while the females of Quarter 1 gained more than the females of Quarter 3.

Comparison of the Achievements and Gains of the Two Longitudinal Cohorts

The mean IQ of Cohort 1 was 107.33 whereas that of Cohort 2 was 106.40. Analysis of covariance, with IQ the covariate, was used in identifying the significance of the differences in the mean achievements and the gains in achievement of the two cohorts. The summary of the tests is presented in Table 5.6.

Table 5.5 Significant Differences (ANOVA $p \leq .05$) in Educational Achievement, Gain from Grade 7 to Grade 8, and Post-hoc Comparisons of Gain by Quarter Interactions for Longitudinal Cohort 1 and Longitudinal Cohort 2: Carl Sandburg Junior High School

	Cohort 1					Cohort 2				
	Sex (S)	Gain (G)	G X S	G X Q	G X S X Q	Sex (S)	Gain (G)	G X S	G X Q	G X S X Q
Word Knowledge	NS	<.001	NS	NS	NS	NS	<.001	NS	NS	NS
Reading	NS	<.001	NS	NS	NS	NS	<.001	.024[2]	NS	.024[4]
Reading Total	NS	<.001	NS	NS	NS	NS	<.001	.009[2]	NS	NS
Language	.007[1]	<.001	NS	NS	NS	.003[1]	<.001	NS	NS	NS
Spelling	NS	<.001	NS	NS	NS	.003[1]	<.001	NS	.017[3]	NS
Math Computation	NS	<.001	NS	NS	NS	NS	<.001	NS	NS	NS
Math Concepts	NS	<.001	NS	NS	NS	NS	<.001	NS	NS	NS
Math Problem Solving	NS	<.001	NS	NS	NS	NS	<.001	NS	NS	NS
Math Total	NS	<.001	NS	NS	NS	NS	<.001	NS	NS	NS

[1] The females achieved significantly higher than the males.

[2] The females gained more than males from Grade 7 to Grade 8.

[3] The lowest quarter of the students gained more from Grade 7 to Grade 8 than the two highest quarters.

[4] The males of Quarter 3 gained significantly more than the males of Quarter 1 (lowest quarter) while the females of Quarter 1 gained significantly more than the females of Quarter 3.

Table 5.6 Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement, Gain from Grade 7 to Grade 8, and Post-hoc Comparisons for Two Longitudinal Cohorts: Carl Sandburg Junior High School

	Cohort (C)	Sex (S)	C X S	Gain (G)	G X C	G X S	G X C X S
Word Knowledge	NS	NS	NS	<.001	NS	.028[4]	NS
Reading	NS	NS	NS	<.001	NS	NS	NS
Reading Total	NS	NS	NS	<.001	NS	.008[4]	NS
Language	NS	<.001[2]	NS	<.001	NS	NS	NS
Spelling	NS	<.001[2]	NS	<.001	.031[3]	NS	NS
Math Computation	.004[1]	NS	NS	<.001	.011[3]	NS	NS
Math Concepts	.003[1]	NS	NS	<.001	NS	NS	NS
Math Problem Solving	.014[1]	NS	NS	<.001	.005[3]	NS	NS
Math Total	.001[1]	NS	NS	<.001	.002[3]	NS	NS

[1] The mean achievement of Cohort 2 was significantly higher than the mean of Cohort 1.

[2] The mean achievement of the females was significantly higher than the mean of the males.

[3] Cohort 2 gained significantly more than Cohort 1.

[4] The females gained significantly more than the males.

The adjusted mean of Cohort 2, averaged across the two times of testing, was significantly higher than that of Cohort 1 in math computation, math concepts, math problem solving, and math total. The difference in achievement between the cohorts was not significant in the other five areas.

There were two significant differences between the achievements of the boys and girls. The mean achievement of the girls of the two cohorts combined, averaged across the two times of testing, was significantly higher than the mean of the boys in language and spelling. The differences between the girls' and boys' mean achievements were not significant in the other seven areas.

The students of the two cohorts combined gained significantly between the two times of testing in all nine areas. There were four significant gain by cohort interactions. Cohort 2 made a larger gain than Cohort 1 in spelling, math computation, math problem solving, and math total. In the other five areas there was no significant difference between the gains of the two cohorts.

The girls of the two cohorts combined gained significantly more in word knowledge and in reading than did the boys. In the other seven achievement areas, the differences in the gains between the boys and girls were not significant. The gain by sex by cohort interaction was not significant in any of the nine areas.

Relationship of Changes in Educational Achievement to Implementation of the Improvement Strategies and Unanticipated Events

One main purpose of this research was to relate the changes in student achievement from year to year to the planned changes that the staff made annually in implementing the improvement strategies. The rationale for using the cross-sectional results regarding student achievement and also the mean achievement of the successive longitudinal cohorts, rather than the gains in achievement of the cohorts, in determining this relationship was presented in Chapter 2.

It should be recalled that the 1977-78 testing was done in May 1978. The results were tabled and interpreted by the staff during the first semester of the 1978-79 school year. Only minor improvement activities were planned and carried out during the second semester of 1978-79. Therefore, the comparison of the achievements of the 1978-79 class with the 1977-78 class is regarded as unrelated to changes in the implementation of the improvement strategies.

The cross-sectional results pertaining to three successive grade 7 and grade 8 classes presented in the preceding part of this chapter are summarized in Table 5.7. The mean scores and national percentile ranks equivalent to the adjusted means are presented to enable the

Table 5.7 Summary of Findings Regarding Mean Achievement of Three Successive Grade 7 and Grade 8 Classes and Percentile Ranks Corresponding to Adjusted Means: Carl Sandburg Junior High School

	Comparison of Successive Classes			Adjusted Means and Equivalent Percentile Ranks					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1979-80 vs 1978-79	1977-78		1978-79		1979-80	
				$\overline{X}$	%ile	$\overline{X}$	%ile	$\overline{X}$	%ile
Grade 7									
Reading Total	NC	NC	NC	92.96	62	92.36	61	93.36	64
Language	NS	NS	NS*	94.76	56	94.62	56	97.09	62
Spelling	NS	S+	S+	95.11	61	95.20	61	98.54	69
Math Computation	NS	S+	S+	95.31	44	96.68	47	99.79	59
Math Concepts	NS	S+	NS	88.58	49	90.44	54	91.33	58
Math Problem Solving	NS	NS	NS*	95.56	49	95.72	49	97.91	54
Math Total	NS	S+	S+	98.22	49	99.32	53	101.72	61
Average Student N				173		149		157	
Grade 8									
Reading Total	NC	NC	NC	97.96	60	97.37	59	97.75	60
Language	NC	NC	NC	100.80	60	99.17	56	99.51	57
Spelling	NC	NC	NC	99.86	54	98.11	50	99.14	52
Math Computation	NS	S+	S+	98.77	39	98.19	36	101.74	53
Math Concepts	NS	NS	S+	91.31	42	90.39	38	93.44	49
Math Problem Solving	S-	NS	S+	99.13	44	96.61	37	100.41	47
Math Total	NS	S+	S+	101.68	45	100.12	39	103.99	50
Average Student N				188		164		159	

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.

S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.

NC Post-hoc not computed since the difference among the successive classes was not significant at the .05 level.

* The adjusted mean was higher for 1979-80 than for both prior years combined.

reader to get a better estimate of the amount of change from year to year. The two subtests in reading are not included in the table, inasmuch as planned improvements, as noted earlier in this chapter, were not related to the specific areas measured by the subtests. On the other hand, planned improvements were carried out related to one or more specific areas of mathematics.

The achievement of the grade 7 class of 1978-79 was not significantly different from that of the grade 7 class of 1977-78 in any of the seven areas. The achievement of the grade 8 class of 1978-79 was not significantly different from that of the grade 8 class of 1977-78 in six areas. The grade 8 class of 1978-79 achieved significantly lower than the grade 8 class of 1977-78 in math problem solving. This lack of significantly higher achievement as well as the lower achievement in math is attributed to the following conditions. First, no planned improvements were made in 1978-79 that affected a large number of students of either grade 7 or grade 8. The other minor planned changes were implemented relatively late in 1978-79. Second, six non-specific planned changes were implemented in 1978-79. These activities took a large amount of time of the principal and a considerable amount of time of the teaching staff.

Moving to 1979-80, we see that the grade 7 class of 1979-80 achieved significantly higher than the baseline class of 1977-78 in spelling, math computation, math concepts, and math total and significantly higher than the 1978-79 class in spelling, math computation, and math total. The adjusted mean of the 1979-80 grade 7 class was significantly higher than that of the two prior grade 7 classes combined in language and in math problem solving. The grade 7 class of 1979-80 did not achieve significantly different from the classes of 1977-78 and 1978-79 in reading total.

The grade 8 class of 1979-80 achieved significantly higher than the grade 8 class of 1977-78 in math computation and math total and significantly higher than the grade 8 class of 1978-79 in math computation, math concepts, math problem solving, and math total. The grade 8 class of 1979-80 did not achieve significantly differently from the two earlier classes in reading total, language, and spelling.

Table 5.8 presents a summary of the differences in achievement between the two longitudinal cohorts. The achievement of longitudinal Cohort 2, averaged across the two times of testing, was significantly higher than the mean of longitudinal Cohort 1 in the four math areas and not significantly different in the three language arts areas. This result is highly supportive of the preceding cross-sectional results for grades 7 and 8.

The planned changes related to the preceding positive results are as follows: using the goal setting strategy in 1979-80 and using the instructional programming strategy more effectively, increasing the amount of time allocated to spelling and language in 1979-80, and starting the math problem solving course in 1979-80 for the grade 7 students and the special math activities for the high achieving grade 8 math students. The planned changes of 1979-80 not accompanied with

Table 5.8 Summary of Findings Regarding Mean Gain and Mean Achievement of Two Successive Longitudinal Cohorts: Carl Sandburg Junior High School

	Comparison of Mean Gain Made by Each Cohort from Grade 7 to Grade 8						Cohort with Higher Average Achievement
	Cohort 1			Cohort 2			
	$\overline{X}$ Gr. 7	$\overline{X}$ Gr. 8	$\overline{X}$ Gain	$\overline{X}$ Gr. 7	$\overline{X}$ Gr. 8	$\overline{X}$ Gain	
Reading Total	93.20	99.13	5.93*	92.11	98.60	6.49*	NS
Language	96.76	100.57	3.81*	95.99	100.25	4.26*	NS
Spelling	95.35	99.01	3.66*	94.50	100.04	5.54*	NS
Math Computation	94.99	98.94	3.95*	96.11	102.16	6.05*	Coh. 2
Math Concepts	88.04	91.43	3.39*	90.07	93.30	3.23*	Coh. 2
Math Problem Solving	94.97	97.71	2.74*	95.01	100.51	5.50*	Coh. 2
Math Total	97.71	101.13	3.42*	98.77	104.16	5.39*	Coh. 2
Student N	136			134			

* The gain from Grade 7 to Grade 8 was statistically significant ($p < .001$).

a significant increase in achievement were related to reading for grade 7 and to reading, language, and spelling for grade 8.

Only three non-specific activities were carried out in 1979-80 in comparison with six in 1978-79. This probably contributed to the greater incidence of higher achievement in 1979-80. The three unanticipated events of 1979-80--the year-long study to determine the possibility of closing the junior high school, the lower enrollment accompanied with the loss of three academic teachers, and the loss of the two grade 8 language arts teachers through resignation--were judged by the principal to have had a strong negative effect on grade 8 student achievement in language and spelling and to a lesser extent in reading.

Results Related to Student Attitudes

A locally constructed attitude inventory of 25 items was administered to the grade 7 and grade 8 students in the second week of December of each year. Five items measure the students' attitudes toward each of the following: school, teachers, learning, peers, and self. The student responded to each item with agree, undecided, or disagree.

To facilitate summarizing the results, a mean rating for each item was obtained by assigning a 3 to the choice indicative of a favorable attitude, 2 to undecided, and 1 to the choice indicative of an unfavorable attitude. The percentages for each item were multiplied by 3, 2, and 1, and the sum of these was divided by 3. The mean ratings for each item, each of the five parts, and the total inventory follow in Table 5.9. A difference between ratings of .10 or greater is regarded by the first author as of practical importance.

The mean for the total inventory for grade 7 was slightly higher each successive year (2.43, 2.47, 2.53). The increasingly higher mean resulted mainly from more favorable attitudes toward school each successive year (2.35, 2.55, and 2.68) and toward teachers (2.49, 2.60, 2.61). Attitudes toward learning, peers, and self remained about the same from year to year.

The mean for the total inventory for grade 8 remained about the same from year to year. However, the grade 8 students' attitudes toward school became considerably more positive in 1979-80 (2.21, 2.22, and 2.53). The grade 8 students' attitudes toward their teachers, learning, peers, and self were generally less positive in 1978-79 than in 1977-78 and more positive again in 1979-80.

Two main conclusions with respect to the change in attitudes may be drawn from these results. First, the grade 7 students' attitudes toward the school and toward the teachers increased moderately from the first to the third year while their attitudes toward learning, their peers, and self remained constant. Second, the grade 8 students' attitudes toward the school increased moderately from the first to the third year while their attitudes toward their teachers, learning, their peers, and self remained relatively constant.

How can the changes in attitudes be explained? Two focused planned changes are probably associated with the more favorable attitudes toward school by the students of both grades 7 and 8 and by the students of grade 7 to teachers: the staff development program of 1978-79 designed to develop a better understanding of middle school adolescents, and the improvement of home-school relations through the formation of a Sandburg Parent Association and the use of other techniques to promote more effective communication with parents. The non-specific planned events of 1978-79 that may have contributed to the more favorable attitudes toward school were starting the intramural athletic program in 1978-79 and the elective program in the allied arts. More attitude changes in a favorable direction might have occurred in 1979-80 except

Table 5.9 Mean Ratings of Attitudes of Grade 7 and Grade 8 Students: Carl Sandburg Junior High School

	Grade 7			Grade 8		
	77-78	78-79	79-80	77-78	78-79	79-80
School						
2. I am proud to be in this school.	2.54	2.73	2.81	2.23	2.38	2.74
7. I wish I could go to a different school.	2.70	2.68	2.74	2.45	2.60	2.70
12. This school has too many rules.	2.27	2.37	2.48	2.03	2.10	2.18
17. Students at this school have a lot of school spirit.	2.04	2.39	2.62	2.26	2.09	2.64
22. This school needs a lot of improvement.	2.20	2.57	2.77	2.06	1.93	2.37
TOTAL	2.35	2.55	2.68	2.21	2.22	2.53
Teacher						
1. I think I have very good teachers.	2.57	2.69	2.81	2.65	2.51	2.59
6. The teachers here try to be fair with all students.	2.52	2.71	2.67	2.59	2.33	2.51
11. My teachers seem to care how I am doing in school.	2.53	2.65	2.71	2.61	2.50	2.61
16. My teachers are well prepared when they meet their classes.	2.52	2.67	2.59	2.64	2.37	2.47
21. My teachers enforce all the school rules equally.	2.31	2.30	2.26	2.19	2.37	2.20
TOTAL	2.49	2.60	2.61	2.54	2.42	2.48
Learning						
4. I think my classes are very boring.	2.37	2.41	2.50	2.26	2.22	2.18
9. I think my schoolwork is too hard.	2.59	2.53	2.58	2.51	2.35	2.50
14. I usually understand my school assignments.	2.67	2.47	2.63	2.62	2.52	2.53
19. I am satisfied with what I am learning in school.	2.65	2.69	2.71	2.59	2.46	2.56
24. I get mixed up a lot in my schoolwork.	2.31	2.22	2.40	2.25	2.21	2.23
TOTAL	2.52	2.46	2.56	2.45	2.35	2.40
Peers						
3. Most of the students in this school are friendly.	2.33	2.33	2.32	2.47	2.41	2.31
8. I have a lot of friends in school.	2.68	2.49	2.71	2.66	2.66	2.68
13. The students in this school are nice kids.	2.29	2.21	2.22	2.37	2.20	2.22
18. My closest friends are students at this school.	2.49	2.55	2.59	2.52	2.50	2.66
23. Most of my friends want to do what I want to do.	2.03	2.00	2.08	2.13	2.19	2.08
TOTAL	2.36	2.32	2.38	2.43	2.39	2.39
Self						
5. Most of my teachers like me.	2.39	2.43	2.37	2.48	2.34	2.40
10. I sometimes wish that I were someone else.	2.10	2.02	2.00	2.10	2.07	2.00
15. Many times I am in trouble at school.	2.63	2.60	2.73	2.58	2.48	2.65
20. My schoolwork is very good most of the time.	2.47	2.49	2.53	2.43	2.43	2.48
25. Most of the children in my classes like me.	2.50	2.46	2.50	2.48	2.35	2.55
TOTAL	2.42	2.40	2.43	2.41	2.33	2.42
INVENTORY TOTAL	2.43	2.47	2.53	2.41	2.34	2.44

for two unanticipated events in 1979-80: the year-long study to determine the closing of either an elementary school or the junior high school and the presumed lower teacher morale that accompanied the loss of three academic teachers because of lower school enrollment. The fact that attitudes of the grade 7 and grade 8 students toward learning, self, and peers did not become more favorable appears unrelatable to the planned improvements.

Conclusions

One purpose of the present research was to determine the extent to which the Sandburg staff could implement three improvement strategies: (a) arranging an appropriate total educational program of courses and other activities for each student, (b) arranging an appropriate instructional program in the subject fields of language, mathematics, reading, and spelling for each student each semester, and (c) setting goals for the students of each I & A Unit and planning and carrying out related improvement activities. The teachers did not plan and monitor individual educational programs of the students formally. Already in 1977-78, they were arranging individual instructional programs for the students in all of the academic subjects and were serving informally as educational advisors to the students. The continuing teachers refined their instructional programming practices each year. Goal setting in reading, language, spelling, and mathematics and carrying out related improvement activities was started in 1979-80. Accordingly, the instructional programming and the goal-setting strategy were implemented concurrently for the first time in 1979-80.

Another objective of the research was to maintain a satisfactory level of student achievement in language, math, reading, and spelling and to raise achievement that was regarded as not satisfactory. The grade 7 class of 1979-80 achieved significantly higher than the class of 1977-78 in spelling, math computation, math concepts, and math total, not significantly different in reading total, and significantly higher than the classes combined of 1977-78 and 1978-79 in language and math problem solving. The 1979-80 class was also significantly higher than the class of 1978-79 in spelling, math computation, and math total. The grade 8 class of 1979-80 achieved significantly higher than the class of 1978-79 in all four mathematics areas and not significantly different in reading, language, and spelling, and significantly higher than the baseline class of 1977-78 in math computation and math total and not significantly different in the other areas. There was only one significantly lower achievement by a later class (1978-79 vs. 1977-78) and it was followed by the next class achieving significantly higher (1979-80 vs. 1978-79). The students of each of the two longitudinal cohorts gained significantly in all seven areas from grade 7 to grade 8. Moreover, the achievements of the second cohort were significantly higher than those of the first cohort in the four mathematics areas. The attitudes of the students toward school remained stable or improved from the first to the last year. The attendance of the students was about the same from year to year. The small difference in attendance is attributable mainly to differences in winter weather conditions, official annual holidays, and vacation periods. Based on these findings we conclude that the concurrent implementation of the instructional programming and goal-setting strategies were quite effective in producing desired student outcomes.

The principal felt that having both grade 8 language arts teachers new to the school in 1979-80 affected grade 8 student achievement in language and spelling negatively. The teachers were unfamiliar with the curriculum and the instructional programming practices; and the principal, because of time constraints, could not offer as much assistance to them as they required. The loss of three teachers in 1979-80 due to lower enrollment and the accompanying reorganization of the four I & A Units into three units and the study to determine whether to close an elementary or the junior high school were all regarded as having a negative effect on student achievement and attitudes but this relationship cannot be assured, based on the quantitative data regarding student outcomes.

In closing, it is appropriate to point out that the principal had very little administrative assistance, namely, a teacher assigned administrative duties for two periods daily. In addition to his many other responsibilities, the principal supervised a major building and remodeling program during 1977-78 and the first semester of 1978-79. In 1979-80 he gave much time to gaining community support not to close the junior high school. A considerable effort was made to solve the problems associated with the lower student enrollment and the related loss of three teachers and the reorganization of the four I & A Units into three in 1979-80. It is very probable that all three improvement strategies would have been implemented more effectively and at an earlier time had the principal been able to give more time to this aspect of administration. And whether more might have been accomplished had an improvement committee been established is uncertain. The principal felt that the improvement efforts were accomplished very effectively through his regular meetings with the different small groups of teachers. Essentially, the entire faculty of this small school acted as the school's educational improvement committee.

CHAPTER 6

CEDARBURG HIGH SCHOOL

Two experimental programs of education were made available to the students of Cedarburg High School starting with the entering grade 9 class of 1977-78 and the traditional program was continued. The three programs were recommended by a committee of the Cedarburg School District, and the recommendations were approved by the school board.

One experimental program, Success Through Alternative Education (STAE), was designed to meet the needs of students who had motivational and other problems making it difficult for them to succeed in a traditional educational environment. This program enrolled 30 students in grade 9 in 1977-78. The second alternative was called Progress in Alternative Continuous Education (PACE). About 100 students enrolled in PACE each year starting in grade 9 in 1977-78. The third alternative was the traditional program that was continued from the prior years. About 200 students enrolled in this program in grade 9 in 1977-78 and each year thereafter. The students in the STAE program continued in it through grade 10 and then entered a regular vocational program of the high school in grade 11. The students of the PACE and traditional programs, with few exceptions, continued in the respective programs from grade 9 through grade 12. New groups of incoming students enrolled in the three alternatives in grade 9 in 1978-79 and each year thereafter.

No test information regarding the STAE students is included in this report and only a small amount of descriptive data are presented regarding the traditional students since the improvement strategies were implemented only in the PACE program, not in the other two programs.

We should note that only the PACE students of grade 9 could be included as the baseline class of 1977-78, inasmuch as all the students of grades 10, 11, and 12 were in the traditional program. As the first PACE students of grade 9 went to grade 10 in 1978-79 and grade 11 in 1979-80, they became the first grade 10 and grade 11 baseline classes, respectively. Accordingly, it was possible to compare the performances of four successive grade 9, three successive grade 10, and two successive grade 11 PACE groups.

It is appropriate to consider two situational variables regarding the PACE program before proceeding to the purposes of the research. One element of the PACE program involved organizing the 100 students of each grade and their four academic teachers into an instruction and advisory unit. The four teachers were to offer the PACE students all their instruction in English, math, science, and social studies. This called for forming a new instruction and advisory team each year as the PACE students moved upward, while maintaining the team for the lower grade. Moreover, each newly formed team was to work out the specific curriculum guides in each subject for use with its students, the advising procedures, and the other educational arrangements.

In grades 9 and 10, in accordance with the carefully worked out plans, the PACE students were taught English, math, science, and social studies by an academic team of four teachers who also served as their educational advisors. In grade 11 there was an unanticipated interruption of the upward extension of the PACE program. An academic team was formed for grade 11; however, only part of the PACE students received their instruction in the academic subjects from PACE teachers, while the rest of the instruction was in traditional classes. Subsequently in grade 12, only an English and social studies team was formed and neither the planned instruction nor the advising were fully implemented with the PACE students.

This interruption of the extension of the PACE program upward one grade each year occurred when the assistant principal who was coordinating the PACE program resigned in 1978-79 to accept a principalship in a nearby high school. With his resignation, the essential staffing, curriculum, instruction, and advising arrangements for grade 11 could not be fully planned in advance of starting the 1979-80 school year, as was initially projected. An assistant coordinator of the program, whose employment was continued on a half-time basis, was unable to carry out the extension of the program completely. Moreover, only English and social studies were required in grade 11 so there was neither a full time mathematics or science teacher in the grade 11 PACE program.

A second important situational variable was related to the school board policy establishing the PACE program. The policy called for the same curriculum, including textbooks, to be used in all the academic courses taken by the PACE and traditional students. Accordingly, the PACE teachers could not bring in advanced or higher level content; instead they could only enrich in depth and in breadth and encourage their students to overlearn. This policy was formulated before any students elected to enter the PACE program in grade 9.

The cooperative research conducted with Cedarburg High School extended from 1977-78 through 1980-81. The purposes of the research were the same as with other schools and were given in Chapter 2.

The achievement areas selected for primary attention were English, mathematics, reading, science, and social studies. Changes in student attitudes were also studied. The administrative arrangement employed at Cedarburg High School to plan, monitor, and implement the improvement strategy in the PACE program in 1977-78 and 1978-79 included an assistant principal and a part-time teacher working with the PACE academic teams. With the resignation of the assistant principal in 1978-79, the part-time teacher assumed responsibility both for the grade 9 and grade 10 program and the extension of it from grade 10 to grade 11 in 1979-80 and from grade 11 to grade 12 in 1980-81.

It should be noted that the new instruction and advisory team that was formed each successive year was recruited from volunteer teachers of the present Cedarburg staff and/or of teachers new to the school. As we shall see later, some teams had as many as three new teachers at the beginning of each school year after 1977-78.

The remainder of this chapter is organized as is indicated in the Table of Contents. It starts with a description of the staffing and enrollment and ends with concluding statements.

Staffing and Student Enrollment

Cedarburg High School enrolls students in grades 9, 10, 11, and 12. It is the only high school of the Cedarburg School District of Cedarburg, Wisconsin. There is one middle school in the district. About 80% of the entering grade 9 students come from the middle school and about 20% from parochial schools. Many persons of Cedarburg work in Milwaukee, which is about 20 miles from Cedarburg. There is some industry and some farming in the district. The community is mainly white collar, upper middle class, and Caucasian. Information pertaining to the staffing of Cedarburg High School, student enrollment, daily attendance, and dropouts follows.

	77-78	78-79	79-80	80-81
No. of building administrators	3	3	3	3
No. of counselors	4	4	4	4
No. of regularly certificated teachers				
STAE	4	6	6	6
PACE	4	8	12	14
Traditional	66	58	55	50
No. of learning disability and special teachers of other exceptional children	2	2	2	3
No. of librarians or media persons	4	4	4	4
No. of school psychologists	2	2	2	2
No. of school social workers	1	1	1	1
No. of aides:				
STAE	1	1	1	1
PACE	1	1	1	1
Traditional	1	1	1	1

There was a 100% change in the administrative staff from 1977-78 to 1980-81, no change in the counseling staff, and a considerable number of new teachers as is now indicated:

	77-78	78-79	79-80	80-81
No. of administrators new to school	2	0	2	3
No. of counselors new to school	0	0	0	0
No. of teachers new to school	4	10	10	6

There were one or more new PACE and traditional English teachers each year, social studies teachers each year except 1980-81, math teachers in the last two years, and science teachers in 1977-78 and in 1980-81. The other new teachers were in other subjects. Moreover, the total number of teachers dropped from 74 to 70 as enrollment dropped.

The total student enrollment was 1376 in 1977-78, 1313 in 1978-79, 1279 in 1979-80, and 1214 in 1980-81. The enrollment in the PACE and traditional programs and the average number of days each student was absent during the year were as follows:

	Enrollment		Average Days Absent	
	PACE	Traditional	PACE	Traditional
1977-78				
Grade 9	99	210	8.2	8.3
1978-79				
Grade 9	111	174	6.4	7.7
Grade 10	96	208	8.4	9.5
1979-80				
Grade 9	114	176	6.4	7.7
Grade 10	111	182	7.4	8.8
Grade 11	90	229	9.7	10.3
1980-81				
Grade 9	110	144	6.4	7.0
Grade 10	104	190	6.6	7.8
Grade 11	99	206	7.8	9.6
Grade 12	67	248	11.9	9.4

There was a drop in the number of grade 12 PACE students in 1980-81 and an increase in the number of traditional students. This occurred since there were not classes in some subjects specifically for the grade 12 PACE students in 1980-81, and not all the PACE students had PACE teachers as their advisors. Many of the continuing grade 12 PACE students took all their classes with the traditional students.

The average rate of absenteeism was slightly higher for the traditional students until grade 12 when it was higher for the PACE students. For all other comparisons, the average absenteeism was higher for the traditional students.

None of the first group of PACE students that entered grade 9 in 1977-78 dropped out of school from grade 9 through the end of grade 11 while 11 traditional students did. None of the second group of PACE students that entered grade 9 in 1978-79 and two traditional students dropped out from 1978-79 through 1979-80. There were no dropouts of either the entering grade 9 PACE or traditional students in 1979-80.

Data Gathered and Analysis of Data by the Cedarburg Staff

Data on all the students were gathered annually. The data for the PACE students were summarized and analyzed by the PACE staff and used in determining areas of possible improvement for the ensuing year. After the last data collection in 1980-81, the data on each individual PACE student enrolled in each grade each year were analyzed by the project staff. The data gathering instruments, the schedule of administration, and the techniques employed by the Cedarburg staff for analyzing the data are now outlined.

Short Test of Educational Ability

Administration: To the PACE and the traditional students of grade 9 in October 1977 and each year thereafter through 1980-81.

Analysis: Obtain the mental ability score from the test publisher's computer printout for all the students of grade 9 starting in 1977-78. Divide the grade 9 PACE students and the grade 9 traditional students into quarters based on their mental ability scores. Compute the mean mental ability of each quarter of the PACE and the traditional grade 9. Change the mean mental ability score to the equivalent percentile rank using the test manual table.

Iowa Tests of Educational Development: Reading comprehension, vocabulary, reading total, language usage, spelling, language arts total, mathematics, social studies, science, and use of sources.

Administration: In October 1977-78 to the grade 9 PACE and traditional students, in October 1978-79 to the grade 9 and grade 10 students, in October 1979-80 to the grade 9, 10, and 11 students, and in October 1980-81 to the grade 9, 10, 11, and 12 students.

Analysis: Using the computer printout from the test publisher, enter the standard score in each area tested of each PACE student of each quarter of mental ability. Compute the mean percentile rank using the appropriate test manual table(s). Carry out the same procedures for the traditional students. This permits comparison of the mean percentile rank in achievement of each quarter with their mean mental ability percentile rank. Carry out this procedure for each entering group of grade 9 PACE and traditional students and continue it as they proceed into the next higher grades.

IOX School Sentiment Index: Seven scores--Teacher Mode of Instruction, Teacher Authority and Control, Teacher Interpersonal Relationship with Students, Learning, Social Structure and Climate, Peer, and General.

Administration: December 1977, 1978, 1979, and 1980 to successive groups of PACE and traditional students.

Analysis: Mean rating on each of the seven scales for each grade.

Information from school records: Total enrollment in PACE and traditional alternatives as of September 1977, 1978, 1979, and 1980, average number of absentees for each year, and dropouts each year.

Improvement Strategies Implemented

by the PACE Staff

The three improvement strategies were employed only by the PACE staff and involved use of the preceding data on student outcomes as well as other information regarding the student. These strategies were described in Chapter 2. One involved arranging an appropriate educational program for the individual student each semester of the school year. Another involved arranging an appropriate instructional program for each student in each course. The third strategy involved setting goals and planning and carrying out related improvement activities either to maintain or to raise the educational achievement of the students of each quarter in mental ability of each grade. Individual educational programming and individual instructional programming were included in the plan that was developed for starting the PACE program, starting with the grade 9 class of 1977-78. Having four grade 9 academic teachers and 100 students organized into a grade 9 I & A Unit was also part of the plan.

Each PACE student's grade 9 educational program was planned in grade 8 in a conference involving the student, a middle school staff member, and the student's parents. In the conference, the required English, mathematics, science, and social studies, other required courses, and electives were indicated. Upon enrollment in grade 9, a teacher member of the I & A Unit advised the student regarding his or her educational program. In the second semester of each successive grade, the teacher advisor, the student, and the parents met to outline the student's educational program for the following year.

The manner in which instructional programming for the individual student was implemented in each academic subject is explained later in the description of Cedarburg High School as of 1977-78. Goal-setting in the academic subjects was planned to start in grade 9 and grade 10 in 1980-81; however, the last test scores to be analyzed were collected in October of 1980.

Although goals were not set, test information was used by the PACE teams of grades 9 and 10 to improve instruction, starting in 1978-79. The standardized achievement test scores and the mental ability test scores were summarized annually as indicated earlier, and summary tables were prepared and presented to appropriate teams of PACE teachers. Table 6.1 is the summary table that was prepared for the PACE grade 9 group of 1977-78.

Table 6.1 gives the mean achievement percentile rank in each subject field and the mean mental ability percentile rank of each quarter of the students. Examination of this table enabled the coordinator and the grade 9 academic team of teachers to make three assessments. First, they compared the mean achievement percentile rank of each quarter in each subject with the mean mental ability percentile rank of each quarter. (The possibility that the test did not have a sufficiently high top for some of the top quarter of the PACE students was recognized.) This comparison indicated whether the educational process

Table 6.1. Quarters of 1977-78 Grade 9 PACE Group in Mental Ability (STEA) and Their Mean Achievement and Equivalent National Percentile Ranks, Based on Iowa Test of Educational Development Administered 9/77: Cedarburg High School

	Quarter 1 National %ile	Quarter 2 National %ile	Quarter 3 National %ile	Quarter 4 National %ile
Total Reading	90	76	61	41
Total Language Arts	91	71	62	47
Mathematics	82	67	58	41
Social Studies	89	72	58	43
Science	84	77	58	40
Use of Sources	88	78	62	50
Mental Ability	97	86	69	40

that the students had experienced in each subject field had worked equally effectively with the students of the four different mental ability levels. Second, they compared how each quarter of the students in mental ability achieved across all six areas tested. From this, they inferred whether each particular quarter was achieving consistently at, below, or above mental ability in all areas. Third, they estimated how well the students had achieved in each subject in relation to national norms by observing the mean national percentile ranks in each area tested.

Earlier we noted that the testing was done in October of the school year. Hence, the grade 9 results reflected student achievement prior to receiving much instruction at Cedarburg High School. Accordingly, the coordinator and grade 9 PACE team examined both the grade 9 results of 1977-78 and the grade 10 results of 1978-79 to estimate the effects of the grade 9 educative processes carried out by the grade 9 team.

Based on these assessments, the coordinator and the team developed plans to raise the mean achievement of the incoming grade 9 students in one or more of the six areas tested and to maintain or to raise the achievement level of one or more of the quarters in the various subjects. This step was implemented to a limited extent for the grade 9 and grade 10 PACE students in 1978-79 and more completely in the last two years of the study. However, as noted earlier, there was a serious limitation to its implementation. When setting the policy establishing PACE, the school board also indicated that the same curriculum, including content and textbooks, would be used in the academic subjects of both the PACE and traditional programs in all grades. Accordingly, the PACE students, and especially the top half of the students, were severely limited in the amount of subject matter they could acquire. The PACE teachers could encourage the students to learn the same subject matter more deeply or effectively but could not teach subject matter assigned to advanced courses.

Description of Cedarburg High School as of 1977-1978

A description of Cedarburg High School as it was functioning in 1977-78 follows. Attention is given the PACE program starting with the administrative arrangements and concluding with the research activities.

Background of the Alternative Programs

In 1977 a committee of high school teachers, parents, students, and administrators completed a 36-month comprehensive assessment of high school education. The committee's report to the Board of Education included recommendations for three educational alternatives within the existing high school.

In the fall of 1977-78 two alternatives were started in grade 9, and the traditional pattern was continued for grades 9 through 12. One of these alternatives, Success Through Alternative Education (STAE), was designed specifically to meet the needs of students who demonstrated attitudinal or learning problems which made it difficult for them to succeed in conventional educational environments. This program enrolled 30 students in grade 9 in 1977-78. A team of four teachers provided their instruction in the areas of English, social studies, reading, and career education. They were mainstreamed in other classes, such as physical education.

The second alternative was called Progress in Alternative Continuous Education (PACE). In 1977-78, 100 grade 9 students who applied for this alternative were admitted. They and a team of four academic teachers of English, mathematics, science, and social studies formed the first Instruction and Advisory (I & A) Unit of the PACE alternative.

The 1977 recommendation, subsequently implemented, was for the PACE alternative to be continued in grade 9 each year and to be extended upward one grade each year. In 1978-79 the PACE students initially enrolled in grade 9 advanced to grade 10 and another I & A Unit of 100 students and an academic team of four teachers was started in grade 9. This pattern continued until there was one I & A Unit in each grade 9, 10, 11, and 12. However, in grade 12 the two English and two social studies teachers (there were no math or science) taught PACE classes only part-time. The STAE alternative was limited to about 30 students and was planned only for grade 9 and grade 10.

The philosophy underlying both the PACE and the STAE programs is consistent with the commitment of the Cedarburg School District to make learning at the high school level a personalized experience which is directly applicable to the needs of students. The PACE alternative extends adaptations of individual educational programming, continuous progress, and educational advising by the teachers from the Webster Transitional School to Cedarburg High School. It provides students and their parents the opportunity to continue this kind of schooling if they feel it is more appropriate for the individual student's educational needs. Students in PACE assume a more active role than students in the traditional program in making decisions about their educational programs, objectives, and activities.

Students are provided information concerning the PACE alternative while they are enrolled in grade 8 at Webster Transitional School and parochial schools in the community. With parental approval, and on a voluntary first-come first-serve basis, they are permitted to register for PACE in the spring preceding their enrollment in grade 9 of Cedarburg High School.

The STAE program is designed to reduce the percentage of students who leave Cedarburg High School prior to graduation. It assures that valuable human resources are not lost and that dignity and worth as contributing members of the community are achievable goals for all Cedarburg students. It provides a kind of personalized schooling that encourages initially disinterested and unmotivated students to continue their education and enables the participating students to acquire marketable job entry skills upon high school graduation.

Administrative Arrangements: Entire School

The administrative staff of Cedarburg High School consists of the principal and two assistant principals. Each administrator has designated responsibilities for the total school. The principal is responsible for all schoolwide management and the coordination of all instruction. One assistant principal is responsible for instruction and coordinates the PACE program. The second assistant principal oversees the operation of STAE. There is a full-time Local Vocational Education Coordinator (LVEC) for the school.

Each of the building administrators has a specific duty with regard to different curricular areas. The principal oversees the instructional program in the areas of foreign languages, music, and art. One assistant principal monitors instruction in science, mathematics, physical education, and driver education, and the other in English and social studies. The Local Vocational Educational Coordinator is responsible for instruction in the areas of industrial arts, home economics, and business education. The school has subject departments but no departmental chairpersons. Accordingly, the administrators coordinate and manage the activities of the departments. The principal meets with the other administrators on a regular weekly basis, although informal contacts among the administrative team occur almost daily.

Besides the administrative team, there is another group, the Educational Improvement Committee (EIC), which meets monthly. It includes the assistant principals and teachers representing each of the subject departments and the STAE and PACE I & A Units. Meetings of this group are chaired by the assistant principal for instruction. The purpose of the EIC is to coordinate instruction across the entire school and to review schoolwide policy which may affect any of the subject areas.

Administrative Arrangements: STAE and PACE

The principal is responsible for the overall coordination of PACE and STAE. In addition, the two assistant principals have been designated as administrative coordinators for the two programs. The assistant principal in charge of STAE is a permanent member of that team and is involved with the actual daily activities related to the operation of that program.

The duties of assistant principal who coordinates PACE follow:

handle chronic or severe discipline and attendance problems referred by teacher advisors in the PACE unit;

coordinate the PACE activities with the activities of the traditional high school and with the activities and practices of the district middle school (Webster Transitional School);

act as an advisor to a group of PACE students;

be responsible for public relations;

work with the PACE staff in the development and evaluation of curriculum, instructional methods, and materials;

organize and conduct meetings to provide background information to students and their parents as a way of aiding program selection prior to entrance in the high school;

develop and administer the PACE budget;

be responsible for an annual written evaluation of the PACE program;

administer the policies of the Board of Education as they relate to PACE;

coordinate student selection procedures; and

coordinate ongoing staff development activities for teachers in the program.

The assistant principal in charge of PACE delegates some of the responsibilities for the daily operation of PACE to an assistant coordinator, a teacher who offers typing to the grade 9 PACE students and serves as an advisor to some of them. (This assistant coordinator became the sole coordinator of the PACE program in 1979-80 and 1980-81 but was employed only on a half-time basis.)

Organization for Instruction and Student Advising

The PACE alternative started in 1977-78 with 100 grade 9 students. The 100 students receive their instruction in English, mathematics, science, and social studies from an academic team of four teachers, with the assistance of an aide. A part-time business education teacher who serves as the assistant coordinator of the PACE program offers typing and also serves as an advisor to some of the PACE students. The responsibilities of the four PACE teachers are: instruction of 100 students in the four academic areas, advising 80 students of the I & A Unit, participation in ongoing curriculum development, supervision of students' independent study projects, and monitoring student independent study time.

The PACE teachers, the aide, and the assistant coordinator meet together each morning from 7:30 to 8:30 for a common team planning session. During this time team members exchange information concerning individual PACE students, work on the curriculum, plan for activities such as parent-student-teacher conferences, and devise ways of utilizing the five-period block of instructional time allocated for the team each day. Decisions concerning the positioning of specific classes (scheduling) for the block of time must be made each day.

The instructional day for the total school is organized into eight 50-minute class periods. All students normally change classes at the end of each period. Exceptions to this are students enrolled in either STAE or PACE who may occasionally have classes in some subject areas extended for a variable amount of time to facilitate the utilization of activities or materials which take longer than 50 minutes.

Teachers of the STAE and PACE units, as well as teachers of the traditional school, are also organized into conventional subject departments. Each department elects one teacher to serve as a representative on the Educational Improvement Committee each school year.

Advisory arrangements. In PACE each teacher, as well as the coordinator and assistant coordinator, serves as an advisor to approximately 20 students. Teacher-advisors are appointed by the assistant coordinator for groups of students at the beginning of grade 9 with the understanding that students may change their advisors at the end of the first year. Students remain with the same advisor throughout their high school years.

Teacher advisors meet with their advisees as a total group and also conduct individual conferences whenever formal contact between the advisor and the advisee is needed or desired. There is no fixed time for advising in the daily schedule. In 1977-78 advisors met individually with their advisees, or with the advisee and one or both parents, approximately 10 times.

The major areas of the teacher-advisor program are the following:

Student program planning: Any activity by the advisor and advisee dealing with the selection of specific courses, evaluating course selections, and making tentative long-range career plans.

Student self-assessment: Analysis made by a PACE or STAE student of his or her behavior or actions related to self-improvement pertaining to course work and other activities.

Awareness of school offerings: Any activity that contributes to student and parent awareness of the total school offerings and its philosophy.

Parent relations and conferences: Special activities designed to increase parent participation in the educative process of their children and to ensure open communication and positive interpersonal relationships among the advisor, student, and parent(s).

Feedback and evaluation: Information gathering and analysis, both formal and informal, to enable the school to develop, modify, or change policies and practices in accordance with its stated philosophy; information that the students provide is very important.

Student decision-making skills: Activities to increase students' understanding of decision-making skills and to develop competence in these skills.

Career planning and preparation: Activities to help students select and prepare for a career.

School/community issues: Activities concerned with students' learning how individuals work together in a community and also learning how to work effectively.

Pattern of Curriculum and Instruction

Courses. A specified number of Carnegie units in the academic subjects is required for graduation by the State of Wisconsin and others are required by the Cedarburg School Board. The PACE students meet these minimum requirements and may elect additional courses in these subjects. To meet the minimum requirements the PACE students receive instruction in mathematics, social studies, English, and science from the teachers of their unit in both grades 9 and 10. PACE students take other courses from teachers in the traditional program. For example, all students in grade 9 must complete two semesters of physical education, and they may also elect courses in music, art, foreign languages, industrial education, home economics, or business education. These required and elective courses are taught by teachers in the traditional school.

One exception to the preceding policy is typing. The PACE grade 9 students take the required four academic courses and physical education each day and have the option of having an independent study period or enrolling in a typing class that is only for PACE students, or in some other elective class. Instruction in this typing class, like the other PACE classes, is based on learning objectives and continuous progress.

In accordance with school board policy, any course designated by a certain title and number included in the PACE curriculum has the same content and carries the same amount of credit as in the traditional program. The same textbooks must be used. However, the instruction in the PACE program is different. One major difference is that each PACE course is divided into units of instruction, and credit toward graduation is based on units of instruction completed rather than by semester attendance or by grades. The duration of each unit is established by the teachers of the courses, with credit given for successful completion based on the proportionate amount of time and credit that the same or similar unit would carry in the traditional school. Credit value for each unit of instruction is stated in tenths of credits. Appropriate credit is awarded upon the completion of each unit of instruction.

As an illustration of this, the traditional grade 9 English course has a value of one Carnegie unit or credit. In the PACE program that same course is divided into units of instruction, each of which carries credit value equal to the credit normally offered for that portion of the course based on the amount of time spent on that unit of instruction in the traditional program. If a teacher would normally spend one-fifth of a semester on that particular unit of instruction, then that unit is worth one-tenth of a credit. If a teacher usually spends two-fifths of a semester on a unit of instruction, then the unit is worth two-tenths of a credit. After successfully completing all of the units for grade 9 English, a student will have earned one credit. However, up to two additional units for .2 of a credit may be completed.

All students in the high school must earn a minimum of 20 credits during grades 9 through 12 in order to graduate. Students in the traditional school receive one-half credit for each semester course successfully completed, one credit for two semesters. PACE students who wish to obtain more than one credit in the required academic subjects earn additional tenths of credit by completing additional units of instruction. Students receive this extra credit on the grade report given at the end of the second semester.

No PACE student is designated as having failed a course. Instead, they are shown as not having completed one or more of the units required for full credit for that particular course. Students with significant deficiencies in a subject field are not allowed to move into more advanced course work in the subject field.

Course objectives and learning activities for the units of instruction for all PACE courses have been written by the teachers. The objectives specify what students are expected to learn, what they are to study, and how they will demonstrate that they have learned. Students receive the instructional objectives in a unit guide distributed at the beginning of each unit of instruction.

Instructional materials. The textbooks used in the courses in the traditional program are also used in the PACE courses. However, instruction in the PACE courses is based on unit guides prepared by the PACE teachers.

The unit guides include a content outline, instructional objectives, and learning activities which are designed to help students achieve the objectives. The format of the unit guides varies from one course to another due to differences in the content, objectives, and activities of each course.

Extracurricular activities. Students in the PACE program may participate in any extracurricular activity that is open to other students in the high school. Activities include a number of clubs, intramural and interscholastic sports, and student government.

Arranging Each Student's Educational Program

Each PACE teacher advisor meets in one or more conference with the advisee in the first semester of grade 9 to plan the student's educational program of courses and extracurricular activities for the second year. In the second semester of grade 9 they finalize the program. In each grade thereafter the advisor and student meet to plan the student's program for the ensuing year. Many parents meet with their child and the advisor in the planning conference.

The advisor monitors the progress of the student informally and assesses the appropriateness of each course and other educational activity for the student. Of special importance in the advising process is the balance of study periods, classes, and extracurricular activities. Students who experience difficulty in completing the units of their courses during one semester are often advised to take a study hall instead of an elective course the next semester.

Instructional Programming in the PACE Courses

A four-teacher team offers the grade 9 required courses in English, mathematics, science, and social studies. Each course is divided into units. There are objectives and related activities and materials for each unit of instruction. For each unit there are objectives and activities for each letter grade of A, B, and C. Each student's ability to learn the particular subject matter, interests, learning styles. and other characteristics are taken into account in these units.

The length of time allocated to units of instruction varies somewhat, but most units are of three weeks in length. The amount of time given to instruction in each academic subject is the usual class period of 50 minutes. However, this can be varied from one day to the next since students take the four classes and an independent study period during a five-period block of instructional time each day. The PACE teachers, in their daily team planning sessions, share in the determination of daily instructional time for the different subject areas.

Arranging an appropriate instructional program for each PACE student in each course starts when the PACE teachers examine each student's record from the middle school to assess each student's level of achievement in each subject field and other characteristics. The PACE teachers also observe the students and have test results available in the advisor record folder.

At the beginning of each unit of each course each PACE student, with the advice of the teacher, decides to work to achieve the A, B, or C objectives of the unit and then works on the correlated A, B, or C assignments and activities. The teacher tries to arrange an appropriate instructional program for students working toward achieving the A, B, or C objectives and to give differential attention to individuals and small groups. The amount of student-initiated and teacher-directed individual work, small-group activity, and whole-class instruction varies somewhat for individual students, the subject fields, and each teacher's preference. Typing has the most individual assignments and activities, while social studies and science have the most whole-class instruction.

Students are evaluated for the attainment of their A, B, or C objectives at the end of the unit. They start the next unit as a group, whether or not they have attained their objectives. Those who have not achieved their objectives do not get the .1 credit for the unit. They are encouraged to complete units during independent study time in grade 9, and it is possible for them to work on objectives of previous units when in later grades in school.

Students who achieve their objectives early in a unit may work on an enrichment unit and receive additional credit toward high school graduation when it is completed. Rarely does a student complete more than one additional unit per year in any one class.

The 100 PACE students are assigned to their English, social studies, and typing classes on a heterogeneous basis. They are grouped for instruction in mathematics and to a lesser extent in science based on their level of achievement and/or aptitude. The results of an algebra aptitude test administered when the students are in grade 8, middle school records of mathematics achievement, and the recommendations of the grade 8 mathematics teachers are used to place the grade 9 students in four sections of algebra. These sections are paced at different rates. The students are placed in either earth science or biology, based primarily one their math achievement in the middle school, their class schedule in mathematics, and their career plans.

Community Learning and Work Experiences

No grade 9 students at Cedarburg High School participate in any organized program of community learning and work experience. A limited number of community resource people come to the school to participate in individual social studies and science courses for PACE students during the school year.

Vocational-type education is carried out mainly in grades 11 and 12 at Cedarburg High School. The school has an extensive program of career exploration and career preparation in these grades, including programs for students who plan to seek employment immediately upon high school graduation.

Evaluation Activities

Teacher-constructed paper-and-pencil tests, teacher observations, performance tests, and work samples are used in evaluating student progress in all units of instruction in the PACE program. These evaluation procedures are related directly to the A, B, and C objectives for each unit of instruction. Students who do not achieve the desired grade level for a unit may retake a unit exam after further study and earn a higher grade than the one previously obtained. The method for determining grade changes differs according to subject area.

Letter grades are reported to the PACE students and their parents upon the completion of each unit of instruction with a hand-carried grade report sheet. This sheet indicates the grade earned, credit earned, teacher comments, and student comments. The grade sheet is returned the next day by the student with a parent signature and parent comments.

Each teacher advisor for the PACE students maintains a folder for each of his or her advisees. Contained in these folders are grade report sheets for all PACE courses and much other information. The folders are sent home to parents for the grade 9 PACE students periodically each semester.

In addition to the biweekly report of progress within PACE classes, parents receive a traditional nine-week report card for courses not included in PACE. Attendance information is reported on the nine-week cards. Nine-week grades are not given for the PACE courses.

At the end of each semester, the report cards of the PACE students are sent to parents to indicate semester grades in each course, semester grade points, and the number of credits earned in each course.

Teacher advisors use their student folders to monitor each advisee's progress in his or her total educational program. The academic team discusses lack of progress by a student, achievement below expectancy, and similar matters, particularly when it occurs in more than one subject. The student typically attends the team meeting with the parents when the student has difficulties in more than one course.

Home-School-Community Relations

A particular goal of the PACE program is to encourage communication between the school and the home. As a result, frequent contacts are made between teachers and parents. Letters are sent to all PACE parents at different times throughout the year explaining different features of the program. As previously noted, parents are also informed biweekly concerning their student's progress in each course. Two conferences which involve a PACE teacher advisor, a student, and the parents are held annually. About 90% of the parents attend these individual advisee-advisor-parent conferences.

Internal and External Support

The teachers in the PACE team have a daily, common preparation period which they use for team planning and other matters related to instruction. This team preparation period is in addition to the preparation period that all teachers have, whether they are involved with PACE or not.

The PACE team also has a full-time instructional aide who performs work that is assigned and supervised by the academic team of teachers.

The Cedarburg School District supports the PACE program by making funds available for teachers to work on curriculum projects during the summer recess, mainly the preparation of curriculum guides to be placed in the hands of the PACE students.

Continuing Research and Development

In cooperation with the Wisconsin R&D Center, the cooperative research reported herein was started in 1977-78.

Staff Changes, Activities to Extend PACE, and Focused Planned Changes

One purpose of the research was to relate the student outcomes to the PACE classroom processes and to the school structures and processes as described for 1977-78 and also to the changes that were made after 1977-78. Accordingly, the school provided the project information about three kinds of changes regarding the PACE program that occurred during each year after 1977-78: (a) staff changes that in the judgment of the PACE coordinator might have influenced the PACE students' attitudes or their achievement in reading, language, and mathematics, and to a lesser extent social studies, science, and use of sources, (b) extension of the PACE program, and (c) changes focused on the improvement of the preceding student outcomes. Non-specific planned changes were not recorded.

1977-78

The first grade 9 PACE Instruction and Advisory (I & A) Unit was started in 1977-78. It consisted of 100 students and four academic teachers of English, mathematics, science, and social studies. The instruction in each PACE course was based on objectives, and students chose whether to achieve objectives for a letter grade of A, B, or C. Curriculum guides were used in each PACE course taught by the team. Each PACE teacher and the PACE coordinator and the PACE assistant coordinator, who was a business education teacher, advised some of the PACE students. This pattern was expected to be extended upward one grade each year until the 1977-78 grade 9 students had completed grade 12.

1978-79

Staff change

The assistant principal, who was the coordinator of PACE, resigned at the end of the year. The assistant coordinator assumed total responsibility for the coordination of PACE in 1979-80.

Two new teachers became part of the PACE grade 9 academic team and the PACE grade 10 academic team was formed.

PACE extension

The second group of PACE students entered grade 9.

The grade 9 PACE students of 1977-78 entered grade 10, becoming the first grade 10 PACE group.

Focused planned change

More emphasis was placed on spelling and grammar in grade 9 English.

An integrated grade 10 PACE English course was taught instead of the separate areas of speech, literature, and composition.

The grade 9 PACE students were placed in four math sections, based on level of mathematical ability. (This started in 1977-78.)

All grade 10 PACE students were required to take geometry, rather than being given a choice of geometry or advanced algebra.

The science required for graduation was increased from one to two years for both PACE and traditional students.

The grade 9 PACE social studies objectives were revised and more choice of objectives and activities was provided to the students.

The grade 10 social studies and math were made a requirement for all grade 10 PACE students.

Grade 9 and 10 PACE teachers studied the IOX results for their group of students and discussed procedures for maintaining or improving student attitudes. This practice was continued each year.

1979-80

Staff change

The high school principal resigned early in the second semester and a district committee, chaired by the superintendent, set policies for the PACE program.

Each PACE academic team of grades 9, 10, and 11 had from one to three new teachers.

PACE extension

The third new group of PACE students entered grade 9, the second group of grade 9 students became grade 10, and the first grade 10 group became grade 11.

A PACE academic team was formed for grade 11. PACE English, math, science, and social studies courses were started in grade 11. However, some PACE students took their courses with traditional students and some PACE teachers also taught traditional courses. Accordingly, the PACE program started to lose its uniqueness in grade 11.

Focused planned change

A silent reading program was started for the grade 9 PACE students.

The grade 10 PACE math program was changed so that about one-fifth of the grade 10 students took advanced algebra, one-fifth algebra, and three-fifths geometry. Students were grouped for geometry instruction according to achievement level.

The PACE and traditional students of grades 10 and 11 were grouped according to achievement level for their English instruction.

The PACE grade 11 English teacher added a grammar emphasis to the PACE English course.

Goal setting was started by some members of the academic teams of grades 9, 10, and 11 for individual students whose achievement in a subject was considerably below mental ability.

1980-81

Staff change

A new principal and two new assistant principals joined the staff.

There were one or more new teachers in each PACE academic team of grades 9, 10, and 11.

PACE extension

The fourth grade 9 PACE group started and the other PACE groups advanced to grades 10, 11, and 12.

PACE English and social studies instruction were extended to grade 12 and the educational advising of the grade 12 PACE students by PACE teachers continued. However, the grade 11 courses in mathematics and science for only PACE students were dropped due to scheduling problems, and grade 12 PACE courses were not started in math and science.

Focused planned change

Grouping students in geometry in grade 10 was discontinued.

An additional .5 credit (semester) of English was made a graduation requirement for both PACE and traditional students.

Goal setting with individual students and for the grade 9 and grade 10 PACE groups was planned to start on a systematic basis. The goals and related planned changes for the 1980-81 grade 10 PACE students, as formulated by the PACE coordinator, follow:

Subject Area: All areas.

Goal: Each of the four aptitude groups, when tested as juniors in 1981, will have a percentile on each achievement test near, or as high as, the group's aptitude percentile; the 1980-81 second one-fourth will have achievement percentiles considerably higher than the current second one-fourth.

Planned Change: Identify the students whose achievement percentiles in each subject are farthest below their mental ability percentiles; study each student carefully to identify possible causes such as low motivation, low work effort, emotional-social problems, or an inappropriate instructional program in the subject. If it appears that the student could or should achieve higher, work with the student and/or the student's parents to increase motivation and work effort, to eliminate emotional or other problems, and/or to arrange a more appropriate instructional program for the student, taking into account the student's aptitude, interests, learning styles, career goals, or other conditions.

Results Related to Educational Achievement

The results from the four successive years of data gathering are reported in this part of the chapter. The cross-sectional results are indicated first. Then the results for the two longitudinal cohorts are presented.

Participating Students

Table 6.2 gives the total number of both PACE and traditional students who had mental ability scores, the number of boys and girls in each group, and the mean mental ability for the four successive grade 9 groups, three successive grade 10 groups, and two successive grade 11 groups, and one grade 12 group. The number of PACE students ranged from 71 to 109 for the four years and the traditional students from 138 to 173.

Table 6.2 shows that the mean mental ability of the four PACE grade 9 groups was consistently higher than that of the four traditional grade 9 groups, i.e., 117.27 vs. 112.02, 114.76 vs. 113.91, 119.91 vs. 112.86, and 116.08 vs. 114.30. These differences in mental ability very likely result from the academic advising and the self-selection process for enrolling in the PACE program, as described previously. Clearly, the two groups were quite different in mental ability, and they were also probably different in other characteristics, such as their career goals and their motivation for academic learning.

Because of the differences generated by the procedures used to enroll students in the PACE program, any differences between PACE and traditional students are confounded with IQ, achievement level, motivation, and other possible differences in the students. Accordingly, it is inappropriate to compare the achievements of the students of the PACE and traditional programs using ANCOVA, with IQ as a covariate, due to the probable treatment by covariate interaction just described.

A statistical examination of the changes in achievement across the years for the PACE students alone, however, is still appropriate. Although the mean IQ for the PACE group differed from year to year, this is not due to any systematic sampling procedure. Rather, it most likely results from random variations in the students from year to year. Hence, ANCOVA was used, with IQ the covariate, to examine differences in achievement among the four successive grade 9, three successive grade 10, and two successive grade 11 PACE groups. In a similar fashion, any initial differences in mental ability between the two PACE longitudinal cohorts were presumed to result from random sources; therefore, ANCOVA was used to compare the achievements of the two PACE longitudinal cohorts. Although no statistical comparisons are made of the achievements of the PACE and traditional cohorts, the amount and direction of the gains based on the separate analyses of the PACE and traditional cohorts are examined.

Table 6.2. Total Number of Traditional Students and Total Number of PACE Students and Their Mean Mental Ability Score for Four Successive Grade 9 Classes, Three Successive Grade 10 Classes, Two Successive Grade 11 Classes and One Grade 12 Class: Cedarburg High School

	1977–1978			1978–1979			1979–1980			1980–1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
GRADE 9												
PACE												
Total	83	117.27	13.27	97	114.76	11.02	109	119.91	11.21	109	116.08	13.06
Male	40	116.00	11.14	46	115.26	10.78	54	120.72	12.02	56	117.00	13.10
Female	43	118.44	15.02	51	114.31	11.33	55	119.11	10.40	53	115.11	13.07
Traditional												
Total	173	112.02	11.51	158	113.91	10.45	171	112.86	11.46	143	114.30	13.44
Male	102	112.15	12.47	69	113.65	11.40	84	112.63	11.63	71	113.63	14.04
Female	71	111.86	10.06	89	114.11	9.72	87	113.08	11.35	72	114.96	12.88

	1978–1979			1979–1980			1980–1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
GRADE 10									
PACE									
Total	83	117.11	13.25	97	114.43	11.03	107	119.86	11.36
Male	41	115.88	10.90	47	114.45	11.34	55	120.45	12.08
Female	42	118.31	15.24	50	114.42	10.84	52	119.23	10.64
Traditional									
Total	162	112.08	11.83	150	113.58	10.58	166	112.99	11.44
Male	95	112.63	12.67	64	113.42	11.16	82	112.44	11.77
Female	67	111.30	10.56	86	113.70	10.20	84	113.52	11.16

	1979–1980			1980–1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD
GRADE 11						
PACE						
Total	71	116.15	12.49	95	114.32	10.95
Male	35	115.11	10.30	46	115.02	10.75
Female	36	117.17	14.38	49	113.65	11.21
Traditional						
Total	154	111.64	11.57	138	113.94	10.62
Male	95	111.97	12.20	58	113.34	11.29
Female	59	111.12	10.57	80	114.36	10.16

	1980–1981		
	N	$\bar{X}$	SD
GRADE 12			
PACE			
Total	72	116.33	13.44
Male	35	115.77	11.48
Female	37	116.86	15.20
Traditional			
Total	151	111.78	11.69
Male	88	111.94	12.68
Female	63	111.56	10.22

Since the PACE and traditional groups are not compared, most of the information regarding the traditional groups is not reported in this chapter. However, the same information that is reported in tables for the PACE groups is reported in tables for the traditional groups in Klausmeier, Serlin, and Zindler (1982).

Comparison of Achievements of the Successive Grade 9, 10, and 11 PACE Groups

Grade 9. The Iowa Tests of Educational Development and the Short Test of Educational Ability were administered to the grade 9 students in October 1977 and to the entering grade 9 students in October each year thereafter through 1980-81. The number of grade 9 PACE students ranged from 83 to 109 and their mean mental ability ranged from 114.76 to 119.91. Analysis of covariance, with mental ability the covariate, was used to compare the mean educational achievements of the four successive grade 9 groups. The achievement test scores are standard scores.

Table 6.3 gives the non-significant differences and any difference found to be significant at or beyond the .05 level for group, for sex, and for group by sex interactions. Also indicated are the post-hoc comparisons for the main effects involving the successive grade 9 groups that were found to be significant at or beyond the .05 level.

Four significant differences for group, six for sex, and two for group by sex interactions are shown, and the direction of the differences are indicated in the footnotes of Table 6.3. The mean achievement of a later grade 9 group was significantly higher than the mean of one or more earlier groups in vocabulary, social studies, and use of sources, but the difference between any two groups was not significant in reading total. The girls' achievement, averaged across the four groups, was significantly higher than the boys' in comprehension, usage, spelling, language total, and use of sources, while the boys' mean was higher in mathematics. We should recall that the achievement testing was done in October of the school year. Thus, the achievement results for grade 9 do not reflect the PACE educational program of grade 9, rather the results for grade 10 do.

Grade 10. The number of students in the PACE grade 10 groups ranged from 83 to 107. Table 6.4 summarizes the differences found significant at or beyond the .05 level and the post-hoc comparisons.

Two of the 10 differences in achievement among the three grade 10 groups were significant. The mean achievement of the 1979-80 group was significantly higher than the mean of the 1978-79 and 1980-81 groups in science. The mean achievement of the grade 10 group of 1980-81 was significantly lower than the means of the 1978-79 and 1979-80 groups in mathematics. The mean achievement of the girls, averaged across the three grade 10 groups, was significantly higher in comprehension, usage, spelling, language total, and use of sources; the mean of the boys was significantly higher in mathematics. The sex

Table 6.3. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement and Post-hoc Comparisons for Four Successive Grade 9 PACE Groups: Cedarburg High School

	Group(G)	Sex(S)	G X S
Comprehension	NS	.019[1]	NS
Vocabulary	.028	NS	NS
Reading Total	.040	NS	NS
Usage	NS	<.001[1]	NS
Spelling	NS	<.001[1]	NS
Language Total	NS	<.001[1]	NS
Math	NS	<.001[2]	NS
Social Studies	.021	NS	.018[3]
Science	NS	NS	NS[3]
Use of Sources	.001	.002[1]	.005

Post-hoc Comparisons for Significant Group Effects

	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Vocabulary	NS	NS	NS	NS	NS	Sign[4]
Reading Total	NS	NS	NS	NS	NS	NS
Social Studies	NS	NS	NS	NS	Sign[4]	NS
Use of Sources	Sign[4]	Sign[4]	Sign[4]	NS	NS	NS

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[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The mean achievement of the males was significantly higher than the mean achievement of the females.

[3] The mean achievement of the females was higher than the mean achievement of the males of the Grade 9 1978-79 group, for the Grade 9 group of 1979-80 the mean achievement of the males was higher than the mean of the females.

[4] The mean achievement of the group of the later year was significantly higher than the mean of the group of the earlier year.

Table 6.4. Significant Differences (ANCOVA $p \le .05$) in Educational Achievement and Post-hoc Comparisons for Three Successive Grade 10 PACE Groups: Cedarburg High School

	Group(G)	Sex(S)	G X S
Comprehension	NS	.010[1]	NS
Vocabulary	NS	NS	NS
Reading Total	NS	NS	NS
Usage	NS	<.001[1]	NS
Spelling	NS	<.001[1]	NS
Language Total	NS	<.001[1]	NS
Math	.007[3]	<.001[2]	NS
Social Studies	NS	NS	NS
Science	<.001[4]	NS	NS
Use of Sources	NS	.017[1]	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The mean achievement of the males was significantly higher than the mean achievement of the females.

[3] The mean achievement of the Grade 10 group of 1978-79 and the mean of the 1979-80 Grade 10 group were significantly higher than the 1980-81 Grade 10 group.

[4] The mean achievement of the Grade 10 group of 1979-80 was significantly higher than the mean of the 1978-79 Grade 10 group and than the 1980-81 Grade 10 group.

difference in the other four areas was not significant. There were no significant group by sex interactions.

Before proceeding to the grade 11 results, we should recognize that the grade 10 PACE group for 1980-81 entered Cedarburg High School in grade 9 in 1979-80. Accordingly, the 1980-81 grade 10 group is the first one that entered after the resignation of the PACE coordinator at the end of 1978-79.

Grade 11. The number of grade 11 PACE students for 1979-80 and 1980-81 was 71 and 95, respectively. The mean mental ability was 116.15 and 114.32 for the two successive groups.

As shown in Table 6.5, the mean of the 1980-81 grade 11 class was significantly higher than the mean of the 1979-80 class in vocabulary, usage, spelling, and language total, and not significantly different in the other six areas. The mean achievement of the girls was significantly higher than the mean of the boys in comprehension, usage, spelling, language total, and use of sources, while the mean of the boys was significantly higher in mathematics. The sex difference was not significant in the other four areas. There were no significant group by sex interactions.

The mean mental ability and mean educational achievements of the PACE grade 12 group are given in a table in Klausmeier, Serlin, and Zindler (1982). These data reflect the results of the PACE grade 11 program, inasmuch as the testing was done in the fall of the grade 12

Table 6.5. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement and Post-hoc Comparisons for Two Successive Grade 11 PACE Groups: Cedarburg High School

	Group(G)	Sex(S)	G X S
Comprehension	NS	.040[1]	NS
Vocabulary	.021[3]	NS	NS
Reading Total	NS	NS	NS
Usage	.002[3]	<.001[1]	NS
Spelling	.010[3]	<.001[1]	NS
Language Total	.001[3]	<.001[1]	NS
Math	NS	.034[2]	NS
Social Studies	NS	NS	NS
Science	NS	NS	NS
Use of Sources	NS	.015[1]	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The mean achievement of the males was significantly higher than the mean achievement of the females.

[3] The mean achievement of the 1980-81 Grade 11 group was significantly higher than the mean of the 1979-80 Grade 11 group.

year. No further discussion of this information is presented, since there was not a later grade 12 PACE group for comparison purposes.

Achievements of Two Successive Longitudinal Cohorts

The first PACE longitudinal group entered grade 9 in 1977-78 and completed grade 12 in 1980-81 and the second longitudinal group entered grade 9 in 1978-79 and completed grade 11 in 1980-81. Longitudinal Cohort 1 consisted of 61 students (29 males, 32 females) who entered grade 9 in 1977-78 and remained in the school through grade 12 in 1980-81. Table 6.6 summarizes the results of the significance tests.

The mean achievement (not gain) of the girls, averaged across the four times of testing, was significantly higher than that of the boys in comprehension, reading total, usage, spelling, language total, and use of sources while the differences between the boys and the girls in the other areas were not statistically significant.

The mean gain in achievement of Cohort 1 from grade 9 to grade 10 was significant in all 10 areas. The mean gain from grade 10 to grade 11 was significant only in social studies and science, and it was significant from grade 11 to grade 12 in vocabulary, reading total, and language total. A significant loss occurred from grade 11 to grade 12 in science.

Table 6.6. Significant Differences (ANOVA $p \leq .05$) in Educational Achievement for Grade 9 through Grade 12 for PACE Longitudinal Cohort 1 and Post-hoc Comparisons: Cedarburg High School

	Sex	Gain	G X S	G X Q	G X S X Q
Comprehension	$.020^{1}$	$<.001^{2}$	NS	NS	NS
Vocabulary	NS	$<.001^{2,4,5}$	NS	NS	NS
Reading Total	$.030^{1}$	$<.001^{2,4,5}$	NS	NS	NS
Usage	$.002^{1}$	$<.001^{2,4}$	NS	NS	NS
Spelling	$.004^{1}$	$<.001^{2,4}$	NS	NS	NS
Language Total	$.001^{1}$	$<.001^{2,4,5}$	NS	NS	NS
Math	NS	$<.001^{2,4}$	NS	NS	NS
Social Studies	NS	$<.001^{2,3,4,}$	NS	NS	NS
Science	NS	$<.001^{2,3,6}$	NS	NS	NS
Use of Sources	$.032^{1}$	$<.001^{2}$	NS	NS	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The gains from Grade 9 to Grade 10, from Grade 9 to Grade 11, and from Grade 9 to Grade 12 were statistically significant.

[3] The gain from Grade 10 to Grade 11 was statistically significant.

[4] The gain from Grade 10 to Grade 12 was statistically significant.

[5] The gain from Grade 11 to Grade 12 was statistically significant.

[6] The drop from Grade 11 to Grade 12 was statistically significant.

No quarter of Cohort 1 in mental ability gained more than any other quarter from one grade to the next in any of the 10 areas as is indicated by the non-significant gain by quarter interactions. Similarly, neither boys nor girls gained more as is shown by the 10 non-significant gain by sex interactions. There were no significant gain by sex by quarter interactions.

PACE Cohort 2 consisted of 87 students (44 males and 43 females) with a mean mental ability of 115.00. A summary of the findings is presented in Table 6.7.

We note, first, that there was no significant difference in the gain among the quarters in mental ability for any of the 10 areas except reading total. Although this difference was significant across the three years, no difference between any two years was significant.

The comparison of the sex differences shows that the mean achievement of the girls was significantly higher than that of the boys in usage, spelling, language total, and use of sources, whereas the mean of the boys was higher in mathematics. The sex difference in the other five areas was not significant. One gain by sex interaction was significant; the gain of the males from grade 10 to grade 11 in science was greater than that of the females. One significant gain by sex by quarter interaction was significant. The males of the lowest quarter

Table 6.7. Significant Differences (ANOVA p ≤ .05) in Educational Achievement for Grade 9 through Grade 11 for PACE Longitudinal Cohort 2 and Post-hoc Comparisons: Cedarburg High School

	Sex	Gain	G X S	G X Q	G X S X Q
Comprehension	NS	<.001[3]	NS	NS	NS
Vocabulary	NS	<.001[3]	NS	NS	.001[8]
Reading Total	NS	<.001[3]	NS	.011[6]	NS
Usage	<.001[1]	<.001[3]	NS	NS	NS
Spelling	.004[1]	<.001[3]	NS	NS	NS
Language Total	<.001[1]	<.001[3]	NS	NS	NS
Math	.007[2]	<.001[3]	NS	NS	NS
Social Studies	NS	<.001[3]	NS	NS	NS
Science	NS	<.001[4]	.009[7]	NS	NS
Use of Sources	.006[1]	<.001[5]	NS	NS	NS

[1] The mean achievement of the females was significantly higher than the mean achievement of the males.

[2] The mean achievement of the males was significantly higher than the mean achievement of the females.

[3] The gains from Grade 9 to Grade 10, from Grade 9 to Grade 11, and from Grade 10 to Grade 11 were statistically significant.

[4] The gains from Grade 9 to Grade 10 and from Grade 9 to Grade 11 were statistically significant.

[5] The gains from Grade 9 to Grade 11 and from Grade 10 to Grade 11 were statistically significant.

[6] There were no statistically significant pair-wise comparisons.

[7] The gain for the males from Grade 10 to Grade 11 was significantly greater than the gain for the females from Grade 10 to Grade 11.

[8] The males of the lowest quarter gained and the females lost; the females of the second quarter gained and the males lost.

gained in vocabulary and the females lost; the females of the second quarter gained and the males lost.

The mean gain of Cohort 2 was significant from grade 9 to grade 10 and from grade 10 to grade 11 in all areas except science and use of sources. The gain in science was significant from grade 9 to grade 10 but not from grade 10 to grade 11, while the gain in use of sources was significant from grade 10 to grade 11 but not from grade 9 to grade 10.

Comparison of the Achievements and the Gains of the Two Longitudinal Cohorts

In this comparison, grade 12 of Cohort 1 is not included since Cohort 2 did not include grade 12. The mean mental ability of Cohort 1 was 116.28 whereas it was 115.00 for Cohort 2. Analysis of covariance, with mental ability the covariate, was used in identifying the significance of the differences between the mean achievement of the two cohorts, averaged across the three times of testing, between the mean achievement of the boys and girls of the two cohorts combined and averaged across the three times of testing, and in the mean gain in achievement between the two cohorts and between the boys and girls. Table 6.8 gives the results of the tests of significance and the post-hoc comparisons.

The mean achievement of the two cohorts was not significantly different in any of the 10 areas. The mean achievement of the girls was significantly higher than the mean of the boys in reading comprehension, reading total, usage, spelling, language total, and use of sources, while the mean of the boys was significantly higher in mathematics. The sex difference was not significant in vocabulary, social studies, and science.

The students of the two cohorts combined gained significantly across the three times of testing in all 10 areas. There were signifi-

Table 6.8. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement and in Gain between PACE Cohort 1 and Cohort 2: Cedarburg High School

	Cohort (C)	Sex(S)	S X C	Gain(G)	G X C	G X S	G X S X C
Comprehension	NS	.008[1]	NS	<.001	NS	NS	NS
Vocabulary	NS	NS	NS	<.001	<.001[3]	NS	NS
Reading Total	NS	.038[1]	NS	<.001	<.001[3]	NS	NS
Usage	NS	<.001[1]	NS	<.001	.020[4]	NS	NS
Spelling	NS	<.001[1]	NS	<.001	<.001[3]	NS	NS
Language Total	NS	<.001[1]	NS	<.001	<.001[3]	NS	NS
Math	NS	.003[2]	NS	<.001	NS	NS	NS
Social Studies	NS	NS	NS	<.001	NS	NS	NS
Science	NS	NS	NS	<.001	.005[5]	NS	.034[7]
Use of Sources	NS	<.001[1]	NS	<.001	<.001[6]	NS	NS

[1] The mean achievement of the females was significantly higher than the mean of the males.

[2] The mean achievement of the males was significantly higher than the mean of the females.

[3] Cohort 2 gained significantly more than Cohort 1 from Grade 9 to Grade 11 and from Grade 10 to Grade 11.

[4] Cohort 2 gained significantly more than Cohort 1 from Grade 10 to Grade 11.

[5] Cohort 2 gained significantly more than Cohort 1 from Grade 9 to Grade 10; Cohort 1 gained significantly more than Cohort 2 from Grade 10 to Grade 11.

[6] Cohort 1 gained significantly more than Cohort 2 from Grade 9 to Grade 10; Cohort 2 gained significantly more than Cohort 1 from Grade 10 to Grade 11.

[7] There were no significant pair-wise post-hoc comparisons.

cant gain by cohort interactions in all areas except comprehension, math, and social studies. Cohort 2 gained significantly more than Cohort 1 from grade 9 to 11 and from grade 10 to 11 in reading vocabulary, reading total, spelling, and language total and from grade 10 to grade 11 in language usage. In science Cohort 2 gained significantly more than Cohort 1 from grade 9 to grade 10; Cohort 1 gained significantly more than Cohort 2 from grade 10 to grade 11. In use of sources Cohort 1 gained significantly more than Cohort 2 from grade 9 to grade 10; Cohort 2 gained significantly more than Cohort 1 from grade 10 to 11. There was one significant gain by cohort by sex interaction; however, none of the paired comparisons was significant.

Relationship of Changes in Educational Achievement to Implementation of Improvement Strategies and Unanticipated Events

Relating the changes in the achievement of the PACE students from year to year to the planned improvements that were made each year in implementing the improvement strategies was one main goal of this research. The findings regarding student achievement used in determining these relationships were derived from the comparisons reported earlier for the four grade 9, three grade 10, and two grade 11 PACE groups and the two PACE longitudinal cohorts. In addition, a comparison was made of the gains in achievement of the two PACE and two traditional longitudinal cohorts. In these comparisons attention is limited to reading total, language total, mathematics, social studies, and science. The curriculum and the instructional programming strategy were focused more directly on these areas than on use of sources and the subareas of reading comprehension, reading vocabulary, language usage, and spelling. Table 6.9 indicates the significant differences and non-significant differences in each achievement area, the adjusted means, and the equivalent percentile ranks.

The difference in achievement among the four successive grade 9 PACE groups, based on the fall testing when they entered the program, was not significant in any of the five subject fields except social studies, where the mean of the PACE group of 1980-81 was significantly higher than the mean of the 1978-79 group. Inasmuch as the fall testing of the grade 9 students does not reflect the grade 9 program of Cedarburg High School, no further discussion of these findings is presented.

The results of the grade 10 fall testing reflect the results of the grade 9 PACE program. The difference in achievement among the three successive grade 10 PACE groups was not significant in reading total, language total, and social studies. However, the mean of the 1980-81 grade 10 group was significantly lower than either of the two prior groups in mathematics. The mean of the 1980-81 group was significantly lower than the mean of the 1979-80 group in science, while the 1979-80 group achieved significantly higher than the 1978-79 group

Table 6.9. Summary of Findings Regarding Mean Achievement of Four Successive Grade 9, Three Successive Grade 10, and Two Successive Grade 11 PACE Groups and Percentile Ranks Corresponding to Adjusted Achievement Means: Cedarburg High School

	Comparison of Successive Classes						Adjusted Means and Equivalent Percentile Ranks							
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80	1977-78	%ile	1978-79	%ile	1979-80	%ile	1980-81	%ile
Grade 9														
Reading Total	NS	NS	NS	NS	NS	NS	15.43	73	14.92	70	14.66	68	15.85	75
Language Total	NS	NS	NS	NS	NS	NS	15.86	69	16.51	74	15.82	69	16.36	73
Math	NS	NS	NS	NS	NS	NS	14.19	73	14.58	74	14.02	72	14.92	76
Social Studies	NS	NS	NS	NS	S+	NS	14.58	68	13.79	61	14.75	69	15.33	71
Science	NS	NS	NS	NS	NS	NS	16.16	64	16.64	65	17.14	71	16.28	64
Average Student N=100														
Grade 10														
Reading Total				NS	NS	NS			17.56	71	16.94	68	17.56	71
Language Total				NS	NS	NS			17.09	69	18.32	75	18.52	76
Math				NS	S-	S-			17.45	75	17.45	75	15.99	70
Social Studies				NS	NS	NS			16.77	68	17.23	73	16.96	70
Science				S+	NS	S-			18.61	67	20.74	77	19.21	70
Average STudent N=96														
Grade 11														
Reading Total						NS					18.13	62	18.79	64
Language Total						S+					17.56	56	19.30	70
Math						NS					18.17	67	18.95	70
Social Studies						NS					18.11	65	18.05	65
Science						NS					19.89	64	20.23	65
Average Student N=83														

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.

in science. Finally, it is noted that the 1979-80 group did not achieve significantly different in any subject field from the 1978-79 group except in science, where it achieved higher.

The grade 11 PACE group of 1980-81 achieved significantly higher than the 1979-80 group in language total and not significantly different in any of the other four subject fields.

The preceding pattern of 15 nonsignificant differences between the achievement of a later grade 10 or grade 11 group and an earlier one, two instances of significantly higher achievement by a later group, and three instances of significantly lower achievement by a later group should probably have been expected in view of the curriculum constraints imposed on the PACE program, the many new teachers to the PACE program each year, the resignation of PACE coordinator at the end of the second year, and the resignation of the principal in the third year. The three instances of lower achievement merit further consideration. It should be recognized that the students of the first grade 10 group of 1978-79 and the first grade 11 group of 1979-80 were, with very few exceptions, the first grade 9 PACE students who entered the school in 1977-78 and then progressed to grades 10 and 11. Similarly, the second grade 10 PACE group of 1979-80 and the second grade 11 group of 1980-81 were part of the second grade 9 PACE students who entered the program in 1978-79. The first set of students had completed grade 9 and grade 10 at the time the assistant principal resigned and the second set had completed only grade 9. On the other hand, the grade 10 group of 1980-81 was the third grade 9 group. It entered in the fall of 1979-80, immediately after the resignation; and it was the only group that achieved significantly lower than an earlier one. Accordingly, the significantly lower achievement in math and science by the 1980-81 grade 10 students can be attributed to the negative effects associated with the PACE coordinator's resignation just prior to their coming into the program in grade 9. It is important to recall that the PACE teams of grades 9 and 10 implemented instructional programming for the individual student and personalized the advising process throughout the project. However, goal setting for the grade 9 and grade 10 PACE groups was not planned to start until 1980-81, the last year that data were gathered in October.

We now turn to the summary information pertaining to the two PACE longitudinal cohorts shown in Table 6.10. The difference between the mean achievement of the two cohorts, based on the first three years of testing for both groups, was not significant for any of the five areas. The gain patterns of the two cohorts are quite similar except that Cohort 1 gained from grade 9 to grade 10 to grade 11 only in science and social studies, whereas Cohort 2 gained significantly from one grade to the next in all four areas except science. As can be inferred from Table 6.10, the actual difference in the mean gains favoring Cohort 2 are substantially larger in reading total, language total, and social studies.

As noted earlier in this chapter, it is inappropriate to compare the gains of the two PACE and the two traditional longitudinal cohorts, using analysis of covariance, with mental ability the covariate. How-

Table 6.10. Summary of Findings Regarding Mean Gain and Mean Achievement for Two Successive PACE Longitudinal Cohorts: Cedarburg High School

	Comparison of Mean Gain Made by Each Cohort							Cohort with Higher Average Achievement
	Cohort 1				Cohort 2			
	$\bar{X}$ Gr. 9	$\bar{X}$ Gr. 10	$\bar{X}$ Gr. 11	$\bar{X}$ Gr. 12	$\bar{X}$ Gr. 9	$\bar{X}$ Gr. 10	$\bar{X}$ Gr. 11	
Reading Total	15.62	17.49	18.61	19.79[1,3,4]	14.15	16.03	18.67[6]	NS
Language Total	15.82	17.72	18.21	19.41[1,3,4]	15.85	17.60	19.59[6]	NS
Math	13.85	17.34	18.66	19.16[1,3]	14.03	16.56	18.99[6]	NS
Social Studies	14.59	16.87	18.67	19.72[1,2,3]	12.98	16.56	17.98[6]	NS
Science	16.00	18.33	20.31	18.54[1,2,5]	15.92	19.94	20.25[7]	NS

[1] The gains from Grade 9 to Grade 10, from Grade 9 to Grade 11, and from Grade 9 to Grade 12 were statistically significant.

[2] The gains from Grade 10 to Grade 11 were statistically significant.

[3] The gains from Grade 10 to Grade 12 were statistically significant.

[4] The gains from Grade 11 to Grade 12 were statistically significant.

[5] The drop from Grade 11 to Grade 12 was statistically significant.

[6] The gains from Grade 9 to Grade 10, from Grade 9 to Grade 11, and from Grade 10 to Grade 11 were statistically significant.

[7] The gains from Grade 9 to Grade 10 and from Grade 9 to Grade 11 were significantly different.

ever, it is appropriate to determine the gains separately for the two PACE cohorts and the two traditional cohorts and then to inspect the differences that are obtained. This comparison does not tell us whether the differences between the PACE and traditional cohorts are or are not statistically significant. Rather, it indicates the amount of the differences between the two groups and the direction of the differences.

Table 6.11 provides the adjusted means of the PACE and the traditional cohorts and the differences between the adjusted means. The difference between the adjusted means was larger favoring PACE Cohort 1 in grade 12 than in grade 9 in all five areas, for example, 2.25 in reading in grade 9 and 2.86 in grade 12. This larger difference indicates a greater gain from grade 9 to grade 12 for PACE Cohort 1 than traditional Cohort 1. Similarly, the difference between the means of PACE Cohort 2 and traditional Cohort 2 was greater in grade 11 than in grade 9 in all five achievement areas, for example, 0.04 in reading in grade 9 and 0.92 in grade 12. These results suggest that the instructional programming carried out in the PACE program in grades 9 and 10 with the first two sets of PACE students had positive effects, despite the curriculum constraint and the changes in the PACE instructional teams from year to year.

Results Related to Student Attitudes

The IOX School Sentiment Index, Secondary Level, was administered to the PACE students of grades 9, 10, 11, and 12 in late November or early December of each year 1977-78 through 1980-81. The students responded to each item of the inventory by indicating strong agreement, agreement, disagreement, or strong disagreement. A favorable response may involve agreement or disagreement. A strong favorable response was scored 4 and a strong unfavorable response 1.

The students did not give their names on the answer sheets. Therefore, it cannot be determined that the students who took the inventory in grade 9 also took it in each succeeding grade 10, 11, and 12. However, the large majority of the students continued from one grade to the next, and it appeared feasible to treat the students as longitudinal cohorts. General trends are presented based on visual inspection of the mean ratings that are given in Table 6.12.

The attitudes of the students of all three cohorts were generally more favorable than unfavorable (above 2.50) to all aspects of their schooling each year. The means on all the subscales each year ranged from 2.50 to 3.30 with only eight exceptions. The exceptions were all for 1979-80 as follows: Grade 11 of Cohort 1 2.37 for teacher authority and control, 2.23 for learning, and 2.48 for social structure and climate; and grade 10 of Cohort 2 2.49 for teacher mode of instruction, 2.24 teacher authority and control, 2.49 teacher interpersonal relationships, 2.46 learning, and 2.49 social climate and structure. There was a considerable drop on five of the seven scales for Cohort 1

Table 6.11. Adjusted Means and Differences between the Means of Two Successive PACE Longitudinal Cohorts and Two Successive Traditional Longitudinal Cohorts: Cedarburg High School

	Comparison of Mean Gain by Each Cohort						
	Cohort 1				Cohort 2		
	Gr. 9 1977-78	Gr. 10 1978-79	Gr. 11 1979-80	Gr. 12 1980-81	Gr. 9 1978-79	Gr. 10 1979-80	Gr. 11 1980-81
Reading							
PACE	15.62	17.49	18.61	19.79	14.15	16.03	18.67
TRAD	13.37	15.39	15.70	16.93	14.11	15.82	17.75
Diff.	2.25	2.10	2.91	2.86	0.04	0.21	0.92
Language							
PACE	15.82	17.72	18.21	19.41	15.85	17.60	19.59
TRAD	13.19	15.18	15.54	16.01	14.95	16.48	18.45
Diff.	2.63	2.54	2.67	3.40	0.90	1.12	1.14
Math							
PACE	13.85	17.34	18.66	19.16	14.03	16.56	18.99
TRAD	12.76	14.98	15.11	16.24	12.93	14.96	16.61
Diff.	1.09	2.36	3.55	2.92	1.10	1.60	2.38
Social Studies							
PACE	14.59	16.87	18.67	19.72	12.98	16.56	17.98
TRAD	12.81	14.37	15.34	16.00	12.77	15.31	18.85
Diff.	1.78	2.50	3.33	3.72	0.21	1.25	0.87
Science							
PACE	16.00	18.33	20.31	18.54	15.92	19.94	20.25
TRAD	14.51	16.75	17.89	16.52	14.73	18.44	18.92
Diff.	1.49	1.58	2.42	2.02	1.19	1.50	1.33
Student N							
PACE	61				87		
TRAD	122				130		

Table 6.12. Mean Favorable Responses to IOX School Sentiment Index for PACE Cohorts: Cedarburg High School

	COHORT 1					COHORT 2				COHORT 3		
	Gr. 9 1977-1978	Gr. 10 1978-1979	Gr. 11 1979-1980	Gr. 12 1980-1981	$\bar{\bar{X}}$	Gr. 9 1978-1979	Gr. 10 1979-1980	Gr. 11 1980-1981	$\bar{\bar{X}}$	Gr. 9 1979-1980	Gr. 10 1980-1981	$\bar{X}$
1. Teacher: Mode of Instruction	2.83	2.64	2.53	2.62	2.66	2.58	2.49	2.61	2.56	2.66	2.61	2.64
2. Teacher: Authority and Control	2.78	2.59	2.37	2.61	2.59	2.60	2.24	2.64	2.49	2.65	2.64	2.65
3. Teacher: Interpersonal Relationships	2.85	2.59	2.53	2.63	2.65	2.51	2.49	2.60	2.53	2.64	2.60	2.62
4. Learning	2.55	2.59	2.23	2.62	2.50	2.55	2.46	2.57	2.53	2.64	2.57	2.61
5. Social Structure and Climate	2.72	2.55	2.48	2.55	2.58	2.57	2.49	2.55	2.54	2.66	2.55	2.61
6. Peer	3.10	2.80	3.30	2.58	2.95	2.81	2.75	2.72	2.76	2.85	2.72	2.79
7. General	2.79	2.88	2.92	2.90	2.87	2.93	2.70	2.87	2.83	3.02	2.87	2.95
Overall Mean	2.80	2.66	2.62	2.64		2.65	2.52	2.65		2.73	2.65	
N =	100	96	89	82		111	110	110		115	110	

from 1977-78 to 1979-80, and a drop for Cohort 2 on all seven scales from 1978-79 to 1979-80.

The favorable attitudes of the PACE students are attributed to the teacher advising and the individual educational programming carried out by the PACE academic teams. The less favorable attitudes in 1979-80 are presumed to be associated with the conditions that followed the resignation of the PACE coordinator at the end of the 1978-79 school year.

Conclusions

One purpose of the present research was to determine how well the PACE staff could implement three improvement strategies: (a) arranging an appropriate educational program for each student, (b) arranging an appropriate instructional program in English, mathematics, reading, science, and social studies for each student, and (c) setting goals for the PACE students and planning and carrying out activities to achieve the goals. Strategies (a) and (b) were implemented reasonably well in grade 9 in 1977-78 and in grades 9 and 10 in 1978-79, but less well in grades 9, 10, and 11 in 1979-80. The last testing was done in October of 1980-81 when the first grade 9 PACE students were in grade 12. From the beginning of the program in 1977-78 a serious obstacle to implementing strategies (a) and (b) was the curriculum constraint that did not permit higher level content to be introduced to the PACE students even though they already had high entering achievement levels Strategy (c) was implemented on only a small scale in 1979-80.

Another objective of the research was to maintain a satisfactory level of student achievement in the five subject fields and to raise achievement that was regarded as unsatisfactory. Achievement of the first two entering PACE groups when in grades 9 and 10 was reasonably high; but it did not improve as desired, primarily because of a curriculum constraint that did not permit the students to acquire advanced subject matter. Despite this constraint, the students' gain in achievement in all five subject areas from year to year was consistently greater than that of two parallel groups of traditional students. The individual instructional programming that the PACE students received when they were in grades 9 and 10 and the personalized advising that they were provided when in grades 9, 10, and 11 apparently contributed to this achievement pattern. Parental involvement was another important positive factor.

Achievement of the entering grade 9 PACE group of 1979-80 and of the two earlier PACE groups that in 1979-80 were enrolled in grade 10 and grade 11, respectively, was less than desired. Contributing to the unsatisfactory achievement were the curriculum constraints mentioned earlier and conditions associated with the resignation of the PACE coordinator in the spring of 1978-79. In addition to the unsatisfactory achievement, the attitudes of the PACE students toward various aspects of schooling became less favorable in 1979-80 and their average daily attendance dropped in 1980-81. It cannot be established unequivocally that some of these unsatisfactory student outcomes would not have prevailed had the PACE coordinator continued.

A postscript is in order. Based upon the gains being made by the first two PACE groups and their favorable attitudes and attendance during the first two years, the superintendent in 1980-81 made several important recommendations to the school board that were accepted. One was that all the academic teachers and the students of grades 9 and 10 should be organized into Instructional Advisory Units starting in the fall of 1981-82. Another was to extend teacher advising into grades 11 and 12 for all students as early as feasible. An implied proposal was to discontinue the separate PACE and traditional alternatives as the previous proposals were implemented.

In 1982-83 all three recommendations had been carried out. The first author's observations were that the primary merits of the PACE program had been maintained. A strong educational improvement committee was functioning. Individual instructional programming and individual educational programming were being implemented somewhat differently but on a more widespread basis throughout the school. Beginning attention was being directed toward goal-setting.

CHAPTER 7

HOOD RIVER VALLEY HIGH SCHOOL

Cooperative improvement-oriented research was carried out with Hood River Valley High School during the years 1977-78 through 1980-81. The objectives of the research were indicated earlier in Chapter 2. The achievement areas selected for attention at Hood River were English, mathematics, and reading. Changes in student attitudes were also studied.

The administrative arrangement employed at Hood River Valley High School to plan, monitor, and implement its improvement strategies involved two existing committees: VITAL and a school cabinet. VITAL consisted of the principal and seven teachers. The school cabinet consisted of the administrative team, five teachers each of whom served as a coordinator of a broad curriculum field, five teachers each of whom was a team leader from one of the five broad fields, and the IMC coordinator.

The organization of this chapter is presented in the Table of Contents and is similar to that of preceding Chapters 3 through 6. It starts with information regarding staffing and student enrollment and conclusions are presented last.

Staffing and Student Enrollment

1977-78 through 1980-81

Hood River Valley High School enrolls students in Grades 10, 11, and 12. It is the only high school of Hood River County, Oregon. There are two junior high schools in the district.

The area is primarily rural. The economy is mainly agriculture and forestry, with the primary agriculture being apples and pears. The community is mainly Caucasian middle class, with a few families of Asian background. A considerable part of the population is engaged in seasonal labor.

The staffing of Hood River Valley, the student enrollment, the average daily attendance, and the number of dropouts for four successive years follow:

	77-78	78-79	79-80	80-81
Student enrollment	785	736	700	607
No. of building administrators	3	3	3	3
No. of counselors	3	3	3	2.5
No. of learning coordinators, curriculum specialists, etc., who teach little or not at all	1	1	1	1
No. of regularly certificated teachers	43.5	43.5	42.5	40
No. of learning disability and special teachers of other exceptional children	1	1	1	1
No. of librarians or media persons	1	1	1	1
No. of school psychologists	0	0	0	0
No. of school social workers	0	0	0	0
No. of other certificated personnel	0	0	0	0
No. of aides	10.5	10.5	10.5	10.5
No. of custodial and other non-certificated personnel not counting aides	15	15	15	15
Average % daily attendance	92	89	83	89
No. of dropouts	46	40	78	30

There was a continuous drop in enrollment each successive year and a quite sharp drop from 1979-80 to 1980-81. The average daily attendance was relatively stable from year to year except for 1979-80 when it was considerably lower than for other years. The number of dropouts was relatively stable except for 1979-80 when it was much higher than for the other years. The lower average daily attendance and the higher dropout rate of 1979-80 are probably related in that the potential dropouts attended school less regularly before officially withdrawing or being dropped. In a parallel manner, there was higher average daily attendance in 1980-81 and a much lower dropout rate. The lower attendance and the higher dropout rate in 1979-80 are probably related to changes made in the requirements for graduation, in the instructional arrangements in various courses, and in the advising arrangements, to be discussed later. Moreover, as these changes become more accepted in 1980-81 by the students and since the grade 10 and grade 11 dropouts were no longer attending school, the average daily attendance increased and the dropout rate decreased to about the same pattern as of 1977-78 and 1978-79.

Data Gathered and Analysis of Data by the Hood River Valley Staff

Data regarding student outcomes were gathered annually. These data were summarized and analyzed by the staff and used in determining areas of possible improvement for the ensuing year. After the last data collection in 1980-81, the data on each individual student and each group of students enrolled in each grade each year were analyzed by the project staff. The data gathering instruments, the schedule of administration, and the techniques employed by the Hood River Valley staff for analyzing the data are now outlined.

General Aptitude Test Battery

Administration: Grade 9 in February 1977 and each year thereafter, and in grades 10, 11, and 12 in March 1977 and each year thereafter for the students who entered Hood River Valley High School without GATB scores.

Analysis: Obtain the G score from the test publisher's computer printout for the students of each grade 10, 11, and 12. Divide the students of each grade 10, 11, and 12 into quarters based on their G scores. Compute the mean G score of each quarter of each grade 10, 11, and 12. Change the mean G score to the equivalent percentile rank using the test manual table(s).

Stanford Test of Academic Skills: Reading, English, and mathematics

Administration: All students of grades 10, 11, and 12 in May 1978, 1979, 1980, and 1981.

Analysis: Enter the standard achievement test scores of each student of each quarter in mental ability. Do this for each grade for each of the three areas tested. Compute the mean achievement for each quarter and convert the mean to a percentile rank using the appropriate test manual table(s). This permits comparison of the mean percentile rank in achievement of each quarter with their mean mental ability percentile rank.

IOX School Sentiment Index: Seven scores--Teacher Mode of Instruction, Teacher Authority and Control, Teacher Interpersonal Relationship with Students, Learning, Social Structure and Climate, Peer, and General. Items measuring the attitude of the students toward their teacher guides (advisors) was added to the IOX.

Administration: Fall 1978, 1979, and 1980 to grades 10, 11, and 12.

Analysis: Mean rating on each of the eight scales for each grade.

Information from school records: Total enrollment as of September 1977, 1978, 1979, 1980, percentage of average daily attendance for each year, and dropouts for each year.

Improvement Strategies Implemented by the Hood River Valley Staff

The improvement strategies worked out by the project director and the Hood River Valley staff involved use of the preceding data on student outcomes, as well as other information regarding the student. One strategy, as was discussed earlier in Chapter 2, was to arrange an appropriate educational program for the individual student each semester of the school year. The second strategy was to arrange an appropriate instructional program for each student in each course, taking into account the student's aptitudes, achievements, career goals, learning styles, and other attributes. The third strategy involved setting goals and planning and carrying out related improvement activities either to maintain or to raise the achievement of the students of each quarter in mental ability of each grade.

Individual educational programming was already being implemented in 1977-78. Each student's entering grade 10 educational program was worked out in grade 9 in a conference involving the student, a senior high school counselor, and the student's parents. In the conference, the career cluster, corresponding to a major field, was selected by the student. Upon enrollment in grade 10, a senior high staff member advised the student on a daily basis regarding the learning units of various courses in which to enroll.

Individual instructional programming was also being implemented in 1977-78. The teachers planned and monitored the instructional programs of each student enrolled in their courses.

Regarding the third strategy, goal setting and planning and implementing improvement activities based on the test results of May 1978 began during the second semester of the next school year, 1978-79. Goal-setting involving educational achievement in the three subject fields and attitudes was started in 1979-80 and continued into 1980-81.

We may now examine how Hood River Valley used the test information gathered each year to plan its improvement activities. Table 7.1 is the summary table that was prepared for the grade 10 group of 1977-78 that had mental ability scores.

Table 7.1. Quarters of 1977-78 Grade 10 Class in Mental Ability (GATB) and Their Mean Achievement and Equivalent National Percentile Ranks, Based on Stanford Test of Academic Skills Administered 5/78: Hood River Valley High School

	Quarter 1		Quarter 2		Quarter 3		Quarter 4	
	National %ile	Scaled Score	National %ile	Scaled Score	National %ile	Scaled Score	National %ile	Scaled Score
Reading	94	216	80	191	72	194	46	175
English	78	[illegible]	54	207	42	199	28	177
Mathematics	89	223	66	202	48	196	28	180
GATB %ile Rank	93		77		60		30	

We see from examining Table 7.1 that the mean achievement percentile rank in each subject field and the mean mental ability percentile rank of each quarter of the students are indicated. Examination of this table for grade 10, and others for grade 11 and grade 12, enabled the principal and the relevant teachers to make three assessments. First, they compared the mean achievement percentile rank of each quarter of each grade in each subject with the mean mental ability percentile rank of each quarter. (The possibility that the test did not have a sufficiently high top for some students of the top quarter, particularly those of grade 12, was recognized). This comparison indicated whether the educative processes in each subject field were working equally effectively with the students of the four different mental ability levels. Second, they compared how each quarter of the students of each grade in mental ability achieved across the three subject fields. From this, they inferred whether each particular quarter was achieving consistently above or below mental ability in all three subject fields. Third, they estimated how well the students of each grade 10, 11, and 12 had achieved in relation to national norms by observing the mean national percentile ranks of each grade in each subject. This enabled them to determine whether each higher grade achieved above or below the next lower grade.

Based on these assessments, the principal and the staff, starting in 1978-79, developed plans to maintain or to raise the mean achievement of one or more of the mental ability quarters of grade 10, 11, or 12 in one or more subject areas. Starting in 1979-80, the annual assessments of the test results were used to set goals and to plan and carry out related improvement activities.

Description of Hood River Valley High School as of 1977-78

Hood River Valley High School is described as it was functioning in 1977-78. This description provides the information that is necessary for relating its student outcomes of 1977-78 to its educational program of 1977-78 and also to the planned improvements that were made each succeeding year.

Background and Philosophy

Hood River Valley High School opened in the fall of 1970. Planning for the school began in 1968, following the passage of a bond issue to build one central facility for all the high school students in the district. Prior to 1970, two high schools were in operation. There were two junior high schools that were continued during the present cooperative research.

In 1970, a system of secondary education was started in the new high school building with major emphasis on creating a learning environment which would enable each student to pursue an educational program specifically designed to meet his or her educational needs. The school's educational program emerged through a continuing process which involved administrators, counselors, teachers, students, and their parents in answering the question: "How can we find practical ways to more nearly reach the ideal of arranging instruction that meets the needs of each individual student?"

The basic aim of Hood River Valley High School is to enable each student to realize his or her potential in social, moral, intellectual, psychological, and physical development; to adapt adequately and effectively to society; and to assume both individual and group responsibility in a democratic society. To support this philosophy, education at Hood River Valley High School is based on the following principles:

> Strong emphasis belongs on individual growth and development.
>
> A successfully functioning individual must have opportunities to grow physically, develop mentally, improve socially, and mature emotionally. Therefore, students must develop basic in-depth competencies, according to their individual interests, abilities, and goals if they are to become productive members of society.
>
> Teachers must be responsive, stimulating, encouraging guides and counselors, with an understanding of human behavior and self-enhancing concepts.
>
> The learning environment must provide the stimulus which enables every student and staff member to appraise objectively the socioeconomic standards in his or her school, home, and community and to work toward their improvement through the democratic process.
>
> Multi-media learning aids and resources which enhance the learning process are important to the educational program.
>
> Effective learning experiences are relevant to the individual student.

Learning results primarily from student involvement in analysis, research, problem solving, organization, evaluation of information, and appropriate application.

Arranging instruction to meet individual student needs is the ultimate goal of the school; progress toward implementing this goal is evaluated frequently.

The evaluation of student progress is based on measurable objectives.

Public education should meet the needs of the individual in the community regardless of age, with the realization that learning is a continuous process from birth until death.

The school staff shares the responsibility for the education of each individual with the home, church, and other community agencies. The staff also shares the responsibility to provide and maintain communication and cooperative planning with these various agencies.

Administrative Arrangements

The administrative arrangements of Hood River Valley High School include the leadership team, the Cabinet, the area coordinators' meetings, and a curricular review committee called VITAL.

Leadership team. The leadership team consists of the principal and two associate principals. This group meets frequently during the school year, although specific meeting times are not fixed and agendas are not prepared in advance of the meetings.

The principal is the final authority for all decisions made within the school. He is viewed primarily as the educational leader and evaluator of the school. The principal is also responsible for the management and overall operation of the school. He is expected to administer all personnel actions, act as a liaison with the community, and serve as the personal representative of Hood River Valley High School to all district meetings and activities. He is also responsible for the preparation of the school's annual budget.

One associate principal is in charge of student activities and discipline, while the other oversees building operations and scheduling. Each of the three administrators has a particular part of the curriculum in which he has supervisory responsibility. The administrators also supervise and evaluate staff.

The administrators of the high school are part of the district administrative team, which is composed of all principals and associate principals in the district, the superintendent and assistant superintendents, and all supervisors in the district. This administrative team provides information regarding major policy decisions prior to the submission of recommended policies to the school board.

Cabinet. Hood River Valley High School has a schoolwide decision-making body called the Cabinet. The primary purpose of this group is to make recommendations concerning major issues in the school to the principal. The Cabinet, which meets frequently at the beginning and end of each school year, consists of the principal, the two associate principals, the six area coordinators of the school's six broad subject fields, and five team leaders from the broad subject fields.

Coordinators' meetings. An executive committee of the Cabinet, composed of the principal and the area coordinators, meets weekly. This group reviews decisions made by the Cabinet and sets agendas for future meetings of the whole group. It also attends to issues which arise in the school between meetings of the full Cabinet. A major responsibility of this group is to ensure that the school's philosophy regarding individualized instruction and continuous progress is implemented.

VITAL. The principal and seven teachers who represent various curricular areas are members of the building curriculum review committee called VITAL. The teachers may or may not also be area coordinators or team leaders. Each teacher member of VITAL is designated as the spokesperson for a number of career clusters. The principal is the chairperson of VITAL. The function of this group is to deal with all changes in the curriculum. VITAL does not have a specified established meeting time, but it meets at least monthly and often weekly.

Organization for Instruction and Advisement

The staff of 42 teachers and 3 guidance counselors is organized into six areas, each headed by a coordinator. The areas are: math/science (9 teachers), physical education/driver education (5 teachers), vocational education (12 teachers), humanities (15 teachers), guidance (3 counselors), and the resource center (1 teacher). Within each broad curricular area, if there are four or more teachers of the same subject, a team leader serves as an assistant to the teacher-coordinator.

The coordinator is responsible for attending all Cabinet meetings and for presenting, in written form, the needs and concerns of the staff within his or her area. The coordinator also assigns teaching duties to teachers, coordinates the use of instructional space within his or her area, reviews and recommends action on proposed new learning units prior to submitting them to the principal for final approval, compiles budget requests from each staff member and submits them to the principal, and allocates funds for supplies. Coordinators are expected to be sensitive to the staff development needs of the individual teachers and either to provide the needed inservice education personally or to see that it is provided by others.

Team leaders assist the coordinators and carry out many responsibilities delegated by the coordinators.

Coordinators receive an additional 15% of their teaching contract salary. They spend an additional 10 days of work each year in fulfilling the duties of their position. Team leaders work an additional 20 days each year and receive and additional 10% pay. Both coordinators and team leaders must apply for their positions. Although the final selection is made by the principal, the two associate principals and other coordinators are also involved in selecting new coordinators and team leaders.

Each staff member, including the 2 associate principals, 42 teachers, 3 counselors, and 2 classified staff persons, is assigned a group of 15-20 students for advisory purposes. The advisor, called a guide, meets five times per week with the guide group of students at regularly scheduled times. The guides assist their advisees with the scheduling of courses and learning units, monitor their academic progress, and serve as the contact person between the parents and the school. In general, the guide is the one adult who knows the individual students in his or her guide group as total human beings. Students with problems which fall beyond the expertise of a teacher guide are referred by the guide to a guidance counselor. Each of three counselors coordinates the activities of one-third of the guides and their advisees and is also responsible for any additional counseling needed by the students. The coordinator of the guidance area participates in all meetings of the Cabinet and the coordinators to ensure that the concerns of the students are heard and that the other five area groups of the school are informed of the guidance program and activities.

Guides have daily, weekly, and periodic duties to fulfill. On a daily basis in group sessions, guides check attendance, make announcements, schedule appointments for individual student conferences, update schedule information for students, and have the students record computer printout data concerning their progress through learning units. Each day guides communicate individual student problems and concerns to other teachers of their advisees.

Weekly, guides review the instructional progress of each of their students, refer students with major problems to appropriate resource persons, conduct group motivational activities and group facilitating activities, and encourage their students to participate in student government activities in school and in community activities.

Periodically, guides conduct discussions concerning student government, communicate with the parents of their advisees, review the progress of their advisees in terms of meeting career goals, and review the computer information that indicates which students have remained in a particular learning unit for more than 20 days.

Each guide group includes students from grade 10 through 12. Generally students remain with the same guide for all three years at Hood River Valley High School. Students select their guides while they are still enrolled as 9th graders in either of the two junior high schools of the district.

Each teacher in the school has daily, weekly, and periodic duties to perform as part of his or her instructional and advising responsibilities. The main duties of teachers are as follows:

teach for five 55-minute class periods each day;

meet with their guide groups for two 30-minute periods and three 10-minute periods each week;

spend one 55-minute period of each day preparing for teaching or related activities; and

take care of other obligations such as staff meetings, hall duty, and individual conferences with students, parents, and other teachers.

Coordinators use one class period each day as released time for conducting activities related to their positions.

The instructional day at Hood River Valley High School is organized into six 55-minute instructional periods. In addition, there are two 30-minute lunch periods each day and 10 to 30 minutes are allocated each day for guide periods.

Pattern of Curriculum and Instruction

Courses. The curriculum of the school is organized into courses, each of which is included in one or more of the school's 26 career clusters or as a basic competency course required of all students for graduation. The career clusters have been organized to encourage students to set career goals and then to achieve the knowledge, skills, and attitudes which are thought helpful or necessary to achieve the goals. Students are able to select from among the 26 career clusters that follow:

Career Clusters

1. Agriculture
2. Forestry
3. Bookkeeping - Accounting
4. Distributive Education
5. General Clerical
6. Steno - Secretarial
7. Home Economics
8. Art
9. Drama
10. Second Language
11. Music (Vocal and Instrumental)
12. Speech
13. Industrial Arts
14. Building Construction
15. Mechanics and Repair
16. Metals
17. Architecture - Engineering
18. Architecture
19. Engineering
20. Math
21. Health
22. Life Science
23. Physical Science
24. Military
25. General College Prep
26. Social Science

Most students select a career cluster while enrolled in grade 9 of one of the district's two junior high schools.

Career clusters are composed of varying numbers of specified courses from different subject fields. Each course is made up of learning units with performance objectives that are designed so that most students should be able to complete the learning units in an average of three weeks. Courses vary in length, the shortest course has a single learning unit and the longest course has 10 learning units.

Although each career cluster is comprised of different courses and has a different career orientation, there are two common elements. First, the total number of learning units in each cluster is 113, equivalent to 11.3 Carnegie credits. Second, all clusters require completion of a certain number of units in certain subject areas that are required of all students. The following subject areas and units, along with 47 minimum competency units, satisfy the Hood River district graduation requirements for grade 9 through 12: 3.0 English, 2.0 social studies, 1.0 health, 1.0 mathematics, 1.0 science, and 1.0 physical education. During grades 10-12 students are permitted to select from a wide variety of specific courses to satisfy these requirements.

In addition to the career cluster of 113 units, 47 units are required of all students for graduation, regardless of career cluster: speech (4 units), writing (5 units), reading (1 unit), social science (7 units), driver education (4 units), personal finance (11 units), career exploration (3 units). These 47 units (4.7 Carnegie credits) satisfy the minimum competency criteria set forth by the district in accordance with Oregon law.

Each student at Hood River Valley High School must attain at least a grade of C in each of the 160 learning units to graduate. One-tenth of a credit is awarded when the objectives for a particular learning unit are met. The teacher further evaluates the student on responsibility and quality of performance in determining grades of A and B.

The student who meets all of the requirements of a cluster and also the minimum competencies before three years have elapsed may exercise different options. These include early graduation, continuing in school and going beyond the minimum cluster requirements, or working out a part-time school/work arrangement. Students who do not complete the 160 learning units required for graduation in a three-year period may either return to school the following year for completion or take courses during a summer session.

If a student experiences difficulty in a particular cluster or in a certain course, there is provision for change. However, the signatures of the student, his or her guide, and his or her parents are required for changing a career cluster. In the event that a student is not making satisfactory progress, it is the responsibility of the teacher and the guide to determine the problem and to take corrective measures.

We now summarize the requirements in reading, writing, and mathematics.

1. Reading. To be graduated from Hood River Valley High School each student must demonstrate a minimum level of reading competency and a second level appropriate for the student's post high school career choice: job entry, technical education, or college education.

Based on the results of the Stanford Test of Academic Skills (TASK) administered in junior high school, each student is placed in either of two required minimum competency learning units in reading in the senior high school: remedial reading or speed reading. Students whose reading scores on the Stanford TASK fall at the 75th percentile or higher are placed in a speed reading course, while students below the 75th percentile are placed in the remedial reading course. Students may elect to take their required reading course at any time during their three years of senior high school.

Every career cluster also requires that students receive some form of reading instruction. In all cases, this requirement may be satisfied by taking developmental reading as part of literature courses. The number of units in developmental reading varies from two in certain clusters to 10 in others.

2. Writing. All students, regardless of career cluster, must master the objectives of the same five learning units of a course, titled Basic Composition. The five learning units need not be completed in any fixed order or during any one semester or year.

Like reading, all career clusters also require students to master the objectives of from 2 to 10 additional learning units in writing. These units are parts of different courses offered in the regular English curriculum.

3. Mathematics. All students are required to master the objectives of 10 learning units in mathematics. Placement of students into particular learning units in mathematics to meet this requirement is based on the results of the Stanford TASK and a locally constructed math placement test administered in ninth grade. Students who achieve at or below specified minimum competency scores on these tests must master the objectives of specified learning units.

Instructional materials. The unipac is the most widely used material in most courses. Unipacs are designed by the Hood River staff and consist of a statement of the comprehensive objectives for the unit, specific objectives to be mastered by the student, an outline of alternative learning activities, and evaluation forms.

Alternative learning activities for each unit include individual activities, large group work, small group work, and the use of audiovisual materials, and selected readings. Reading selections may be found in either the textbooks located in the areas of the building devoted to the various academic areas or in the Instructional Materials Center (IMC). Audiovisual materials are also located in either the classrooms or in the IMC.

Some new unipacs are added each year. Revisions must also take place for older unipacs. The school district provides funds to enable teachers to work on the development of instructional materials during the summer.

The IMC is in a large open area that is easily accessible to students from all the classrooms. It contains teacher work areas and offices, library books, listening/viewing areas for audiovisuals, an area for preparing media, and two resource desks, one for the humanities division and another for math-science. Tests are administered to students who have completed units in those two divisions. Part of the IMC also is used for classrooms during the day, and corners of it are used for small group discussion.

The IMC is supervised by a full-time director who has the assistance of a number of aides. The director serves as one of the six division coordinators and participates in the Cabinet.

Extracurricular activities. Extracurricular activities include 27 different student clubs, each under the supervision of a faculty sponsor. The organizations that were active during 1977-78 included:

- Aeronautics Club
- Anthropology Club
- Auto Club
- Art Club
- Chess Club
- DECA (Distributive Education) Club
- Drill Team
- French Club
- Forensics
- Future Homemakers of America
- Future Farmers of America
- German Club
- Girl's League
- International Relations League
- Intramural Athletics
- Letterman's Club
- Majorettes
- Mountain Club
- National Honor Society
- Pep Club
- "S" Club (Community Service)
- Service Club (School Service)
- Ski Club
- Spanish Club
- Spirit Council
- Stage Band
- Swing Choir

In addition to these clubs, students are encouraged to participate in student government. Each guide group elects one student to serve as a representative to the Student Government Council. Student officers are elected on a schoolwide basis.

Opportunities are also provided for students to participate in a complete range of fall, winter, and spring sports.

Educational Programming for the Individual Student

The educational program of the student each semester is based on (a) the career cluster the student is pursuing, courses that can be taken related to the chosen cluster, and learning units that can be taken related to each course; (b) the preparation option chosen by the student, i.e., job entry, technical education, college education; and (c) the basic competency requirements for all students. Each student meets with his or her guide to plan a semester program of course work and a weekly and daily program of learning units.

Instructional objectives for the individual student are determined by the courses which are included in the career cluster selected by the student and by the student's preparation option. Certain learning units of the various career clusters are for any student; others are for the job entry student and/or technical education student only; others are for the college and/or technical education student only.

Preassessment connected with both career cluster selection and placement in minimum competency courses in mathematics, reading, and writing occurs during grade 9 for all students except those who enter Hood River Valley High School after the beginning of grade 10. Aptitude, achievement, and interest testing are carried out to help the student choose a career cluster and also the job entry, technical education, or college option. The Stanford Test of Academic Skills is used for placing students in courses in reading, writing, and mathematics.

After grade 9, no pretesting occurs prior to students enrolling in any learning unit of any course. Rather, students may take successive learning units for which there are prerequisites only if they have completed the prerequisite units. There is no pretesting to identify students who may have already mastered the objectives of any unit. However, students who achieve mastery in less than three weeks are identified after the learning unit begins.

Each student's daily instructional program consists of a number of learning units of his or her career cluster and/or other minimum-competency learning units. The particular learning units comprising the daily program are based on what the student has already completed and what remains to be completed.

Learning units typically include a variety of instructional materials and activities to permit students to learn in accordance with their interests and learning styles. Individual work, small group activities, and class size group activities are carried out in many learning units.

Every learning unit requires mastery of the unit objectives in order for the student to be awarded credit toward graduation. A student may be evaluated for mastery of the objectives at any time during a learning unit. The predominant evaluative procedure is the paper-and-pencil test, but other methods such as performance tests, work samples, and observation of student performance are also used.

In some courses, the student must master the objectives of the sequentially arranged units before being permitted to move to the next learning unit in the sequence. Upon mastery of the objectives of a learning unit of either a sequenced or nonsequenced course, the student may go into any other nonsequenced unit of any course that has an opening. Accordingly, students may start units without completing them during a semester and may enroll in units of many different courses, provided that the guide approves. Students having difficulty in one or more learning units may be referred by their guides to a tutoring program staffed by community volunteers.

Community Learning and Work Experiences

The community provides many learning opportunities for students as part of their course work. Students go into the community for these experiences, and community resource persons come into the school.

Students pursuing the job-preparation option in any career cluster may take up to 30 learning units involving work experience for which they receive credit for graduation. Students pursuing the technical education option may also take some learning units involving work experience as part of the requirements of certain career clusters. Those pursuing the college option may take some work experience units as part of their electives.

Home-School-Community Relations

An elected community advisory committee meets monthly. The principal mails home a monthly newsletter informing parents about happenings in the school. News releases are issued to the local radio station and the local weekly newspaper.

Some of the career clusters have lay advisory committees who meet monthly to assist with carrying out the goals of the clusters. The agriculture advisory committee is among the most active.

The guides play a major role in the school's program of home-school-community relations. They are responsible for keeping the parents of the students in their guide groups informed of student progress and any problems that may occur.

Annual parent conferences are held, at which time up to 90% of the parents are contacted.

Evaluation Activities

Prior to 1977-78, the Iowa Test of Educational Development (ITED) was administered in grades 9 and 11 in mathematics, language arts, reading, use of sources, science, and social studies to evaluate the school's educational program. In 1977-78, the decision was made to change to the Stanford TASK tests in mathematics, English, and reading. In conjunction with the program of cooperative research with the

Wisconsin Center for Education Research, it was decided to administer the Stanford TASK to all students in grades 9 through 12. This procedure was followed in 1977-78.

Teachers use paper-and-pencil tests, performance tests, work samples, teacher observation, and similar procedures to evaluate each student's mastery of unit objectives. The guide monitors each student's progress in all learning units and receives information daily from the computer services regarding each student's progress or lack of it. This process serves as an ongoing means of evaluating the student's total educational program and making adjustments in it. Guides refer students having difficulties in courses to a counselor who may in turn refer the student for psychological services or to a tutoring program staffed by community volunteers.

A comprehensive follow-up study of each graduating class is conducted each year. The person most directly responsible for this evaluation is the Associate Principal for Student Services. A survey instrument is mailed to each graduate during the winter following his or her graduation. Results of this survey are kept on file as a way of evaluating graduate perceptions of Hood River Valley's educational program.

Internal and External Support

Within the school, the various teams, councils, and committees attempt to maintain a facilitative environment for learning and teaching. The school district provides financial support for some of the faculty to participate in summer curriculum projects. Learning units and instructional materials are developed or revised through these summer projects.

Continuing Research and Development

In cooperation with the Wisconsin Center for Education Research, cooperative improvement research was started in 1977-78.

Unplanned Events, Non-specific Changes, and Focused Planned Changes

Three kinds of changes follow in outline form for each year of the four years of the study: (a) unplanned events that in the judgment of the principal might have influenced student achievement or attitudes, (b) non-specific planned changes related to some aspect of the school program that were not directed toward raising educational achievement in one of the three subject areas or student attitudes, and (c) planned changes focused on the improvement of student achievement or attitudes.

1977-78

The school's research procedures and improvement plans were formulated. The improvement strategies and school structures and processes as indicated in the 1977-78 description of the school were continued.

1978-79

Unplanned event

A teacher strike occurred in later November and early December that lasted 10 days.

An associate principal resigned and was replaced.

Nine new teachers started and 10 of the prior year left.

Non-specific planned change

None

Focused planned change

An honors program was started for juniors and seniors; 30 of 185 seniors completed it; 40 juniors started it in September 1978.

An improvement committee for reading was formed to plan a schoolwide improvement program in reading.

A math placement program was started. All students were tested using a locally constructed math test; all grade 10 students and some grade 11 and grade 12 students were placed in math courses based on the test results.

1979-80

Unanticipated event

A snowstorm reduced a planned 3-day inservice program for the improvement of reading to 1/2 day.

Non-specific planned change

An associate principal assumed the supervisory responsibilities previously performed by the principal so that the principal could devote more time to management.

A "Key Communicator Program" was started involving selected community leaders, including parents.

Focused planned change

A grade 10 required English course equivalent to .5 Carnegie credit was started.

A pilot project was conducted to improve reading achievement that involved one teacher from each broad curriculum field. Inservice was held for participating teachers.

Goals were set in grade 10, grade 11, and grade 12 in English, mathematics, and reading. The goals and planned changes for grade 10 follow:

CURRICULAR AREA	GRADE	GOAL	PLANNED CHANGES
Reading	10	Each of the four mental ability quarters will have a reading achievement percentile as high as, or higher than, the mental ability percentile of the quarter.	During 1979-80 one teacher from each of the nine subject areas will participate in a reading project with staff from the Wisconsin R&D Center. The goal is to implement a schoolwide reading improvement program.
Math	10	Each of the four mental ability quarters will have a mathematics achievement percentile as high as, or higher than, the mental ability percentile of the quarter.	The school curriculum committee is in the process of recommending additional requirements in math, particularly for the top two quarters.
English	10	Each of the four mental ability quarters will have an English achievement percentile as high as, or higher than, the mental ability percentile of the quarter. Since English was lower than math and reading for the past two years, a second goal is to bring the English percentile ranks for all quarters up to a level comparable with math and reading.	A 10th grade English curriculum revision will require all 10th graders to take a five unit sequence of grammar review and composition.

1980-81

Unplanned event

A citizens committee, including some parents, was formed and proposed to the school board more structure in the instructional arrangements, curriculum, and student advising.

The reading improvement program was not extended because of lack of funds for inservice.

Non-specific planned change

An associate principal assumed responsibility for planning and decision-making regarding scheduling of classes and gave more attention to teacher evaluation.

A parent survey of the planned changes was conducted as part of the continuing "Key Communicator Program."

All teachers attended a one-day Assertive Discipline Workshop and followed up by developing a list of schoolwide, departmental, and classroom expectations to be displayed throughout the school.

Focused planned change

Goal setting was continued for grades 10, 11, and 12 in English, math, and reading.

All courses were arranged so as to require the student to complete three learning units of the course rather than only one unit, and each student was required to stay in a course until assigned to another course.

The math teachers prescribed the math courses for all grade 10, 11, and 12 students, taking this responsibility from the teacher advisors. A printed guide for individual students was devised to facilitate planning the student's math course work.

A student accountability system was devised to ensure that students completed more units that they started and to monitor their total educational programs.

The 26 career cluster outlines were modified with an Individual Learning Plan. Rather than selecting a career cluster of courses when in grade 9, a grade 10-12 program of high school courses was planned with each student. Provisions were made for making course changes each year.

The graduation requirements were increased by making one year of U.S. history required, adding one year of math or science, and requiring 1/4 year of physical fitness each year. Some of the required "life skill" units (Oregon minimum competencies) were no longer required of all students.

Grades of D and F were added. A system was worked out to notify the parents when a student was judged by a teacher not to be working up to ability.

Results Related to Educational Achievement

The results for four grade 10, four grade 11, and four grade 12 classes are reported in the first part of this section. Then the results pertaining to the achievements of two longitudinal cohorts are indicated.

In this chapter much information is presented in summary tables. The original tables on which the summary tables are based are listed in the appendix and are presented in Klausmeier, Serlin, and Zindler (1982).

Participating Students

Table 7.2 gives the total number of students, the number of boys and girls, and the mean mental ability scores for the four grade 10, grade 11, and grade 12 classes. The Ns for the four grade 10 classes ranged from 132 to 195, for grade 11 from 114 to 156, and for grade 12 from 110 to 145. The mean mental ability scores for grade 10 ranged from 94.04 to 103.73, for grade 11 from 94.91 to 106.36, and for grade 12 from 102.01 to 105.78. Similar variations in mental ability were found for the girls and for the boys from year to year. This information is descriptive of the mental ability of the student population for the four years and is not discussed further in this chapter.

Information Gathered

The Stanford Test of Academic Skills Form B, Level 2, 1972, was administered to the students of each grade at one-year intervals. The three scores obtained annually were reading, English, and mathematics. The General Aptitude Test Battery (GATB), Form B, 1965, was administered annually to the students in grade 9 when they were in one of the two junior high schools of the district. The GATB yields a single general aptitude score that is derived from the verbal, numerical, and spatial subtests. In the analyses of the data that follow, the achievement test raw scores and the GATB IQ score were used.

Table 7.2. Total Number of Students of Four Successive Grade 10 Groups, Four Successive Grade 11 Groups, and Four Successive Grade 12 Groups and Their Mean Mental Ability: Hood River Valley High School

	1977-1978			1978-1979			1979-1980			1980-1981		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
Grade 10												
Total	195	101.66	14.77	160	103.73	14.06	173	95.28	14.78	132	94.04	15.50
Male	101	95.90	15.62	79	105.33	14.08	92	94.11	15.89	61	92.70	13.33
Female	94	103.55	13.63	81	102.17	13.95	81	96.62	13.39	71	95.18	17.16
Grade 11												
Total	151	105.36	13.26	169	102.42	14.10	114	106.36	13.66	156	94.91	14.61
Male	66	106.85	10.95	88	100.91	14.44	58	107.16	14.68	86	93.86	15.69
Female	85	104.20	14.76	81	104.06	13.62	56	105.54	12.59	70	96.20	13.18
Grade 12												
Total	116	102.01	16.97	137	105.77	13.43	145	104.52	13.79	110	105.78	14.03
Male	59	105.53	17.13	60	107.33	11.24	73	103.51	14.44	55	106.87	14.96
Female	57	98.37	16.16	77	104.55	14.88	72	105.54	13.12	55	104.69	13.09

Comparison of Achievements of Successive Grade 10, Grade 11, and Grade 12 Groups Having Mental Ability Scores

For grade 10 the number of students who had mental ability scores and who took the achievement tests was 195 (101 males and 94 females) in 1977-78, 160 (79 males and 81 females) in 1978-79, 173 (92 males and 81 females) in 1979-80, and 132 (61 males and 71 females) in 1980-81. The similar numbers for grade 11 are 151 (66 males and 85 females) in 1977-78, 169 (88 males and 81 females) in 1978-79, 113 (57 males and 56 females) in 1979-80, and 156 (86 males and 70 females) in 1980-81. The corresponding numbers for grade 12 were 116 (59 males and 57 females) in 1977-78, 137 (60 males and 77 females) in 1978-79, 145 (73 males and 72 females) in 1979-80, and 110 (55 males and 55 females) in 1980-81.

The mean mental ability of the students of all three grades varied considerably from year to year. The means for the boys and girls did also. Accordingly, analysis of covariance (ANCOVA), with mental ability score the covariate, was used to compare the mean educational achievements of the four successive grade 10, 11, and 12 classes.

As shown in Table 7.3, significant differences were found among the adjusted means of the four grade 10 groups and the four grade 11 groups in all three achievement areas. The mean achievement of the grade 10 group of 1978-79 was neither higher nor lower than the mean of the group of 1977-78 in reading, English, or math. The mean achievement of the grade 10 group of 1979-80 was significantly higher than the mean of the grade 10 groups of 1977-78 and 1978-79 in reading, English, and math. The mean of the grade 10 group of 1980-81 was significantly higher than the mean of the grade 10 groups of 1977-78 and 1978-79 in reading, English, and math but neither higher nor lower than the 1979-80 group in any area.

The mean of the 1980-81 grade 11 group was significantly higher than the mean of 1977-78, 1978-79, and 1979-80 grade 11 groups in reading, English, and math with one exception, namely, in English the

Table 7.3. Significant Differences (ANCOVA $p \le .05$) in Educational Achievement and Post-hoc Comparisons for Four Successive Grade 10, Grade 11, and Grade 12 Groups with Mental Ability Scores: Hood River Valley High School

	Main Effects			Post Hoc Comparisons					
	Group(G)	Sex(S)	G X S	1977-78 vs 1978-79	1977-78 vs 1979-80	1977-78 vs 1980-81	1978-79 vs 1979-80	1978-79 vs 1980-81	1979-80 vs 1980-81
Grade 10									
Reading	<.001	.002[2]	NS	NS	Sign[1]	Sign[1]	Sign[1]	Sign[1]	NS
English	<.001	.001[2]	NS	NS	Sign[1]	Sign[1]	Sign[1]	Sign[1]	NS
Math	<.001	NS	NS	NS	Sign[1]	Sign[1]	Sign[1]	Sign[1]	NS
Grade 11									
Reading	<.001	NS	NS	NS	NS	Sign[1]	NS	Sign[1]	Sign[1]
English	<.001	<.001[2]	NS	NS	NS	Sign[1]	NS	NS	Sign[1]
Math	<.001	NS	NS	NS	NS	Sign[1]	NS	Sign[1]	Sign[1]
Grade 12									
Reading	NS	<.001[2]	NS	(No post-hoc comparisons were computed since group effect was not significant at .05 level).					
English	NS	<.001[2]	NS						
Math	NS	NS	NS						

[1] The mean achievement of the group of the later year was significantly higher than the mean of the group of the earlier year.

[2] The mean achievement of the females was significantly higher than the mean of the males.

1980-81 grade 11 group was not significantly higher or lower than the 1978-79 group. The means of 1979-80 and 1978-79 grade 11 groups were not significantly higher or lower than the prior grade 11 groups in any achievement area. Similarly, the mean of no later grade 12 group was significantly higher or lower than the mean of any of the three prior grade 12 groups.

Table 7.3 shows that significant main effects were found for sex. The girls of grade 10 and 12 achieved significantly higher than boys in reading and English while the girls of grade 11 achieved higher in English but not in reading. The sex difference in mathematics was not significant for any grade. There were no significant group by sex interactions.

Comparison of Achievements of Successive Grade 10, Grade 11, and Grade 12 Groups Not Having Mental Ability Scores

Complete tabular information regarding the four grade 10, grade 11, and grade 12 groups not having mental ability scores is given in Klausmeier, Serlin, and Zindler (1982). The number of grade 10 students not having mental ability scores who took one or more tests was 48 in 1977-78, 44 in 1978-79, 34 in 1979-80, and 49 in 1980-81. The number of grade 11 students was 57 in 1977-78, 47 in 1978-79, 36 in 1979-80, and 43 in 1980-81. The corresponding number of grade 12 students was 35 in 1977-78, 62 in 1978-79, 35 in 1979-80, and 40 in 1980-81. Students not having mental ability scores were mainly transfer students. They either were not tested after entering Hood River Valley or their scores inadvertently were not provided to the project.

The important finding is that the grade 10 group with mental ability scores achieved significantly higher than the group without mental ability scores in English, and the grade 11 and grade 12 groups with mental ability scores achieved significantly higher in English and math. The differences in reading were not significant for any grade.

Achievements of Two Successive Longitudinal Cohorts

Longitudinal Cohort 1 consisted of 134 students (67 males and 67 females) who entered grade 10 of Hood River Valley High School in 1977-78, remained through grade 12 in 1979-80, took the three achievement tests each year, and had mental ability scores. Longitudinal Cohort 2 entered in 1978-79 and had 100 students (50 males, 50 females). Table 7.4 gives the results of the tests of significance for Cohort 1 and the results of the post-hoc comparisons that were computed when a difference significant at or beyond the .05 level was found.

The mean achievement (not gain in achievement) of the girls in English, averaged across the three times of testing, was significantly

Table 7.4. Significant Differences (ANOVA $p \leq .05$) in Educational Achievement, Gain from Grade 10 to Grade 11 to Grade 12, and Post-hoc Comparisons for Longitudinal Cohort 1: Hood River Valley High School

	Sex(S)	Gain(G)	G X S	G X Q	G X S X Q
Reading	NS	<.001[2]	NS	.002[4]	NS
English	<.001[1]	<.001[3]	NS	NS	NS
Math	NS	<.001[3]	NS	NS	NS

[1] The mean achievement of the females was significantly higher than the mean of the males.

[2] The gain from Grade 10 to Grade 11, from Grade 10 to Grade 12, and from Grade 11 to Grade 12 was statistically significant.

[3] The gain from Grade 10 to Grade 11 and from Grade 10 to Grade 12 was statistically significant.

[4] The lowest quarter gained significantly more than the second quarter from Grade 10 to Grade 11 and from Grade 10 to Grade 12.

higher than the mean of the boys. The sex difference was not significant for reading or math.

The mean gain of the total students of Cohort 1 across the three times of testing was significant in English, reading, and math. The gain was significant from grade 10 to grade 11 and from grade 10 to grade 12 in English and math and from grade 10 to grade 11 and from grade 11 to grade 12 in reading.

The lowest (first) quarter of Cohort 1 in mental ability gained significantly more than the second quarter in reading from grade 10 to grade 11 and from grade 10 to grade 12. The differences in reading between the other pairs of quarters were not significant. The gains of the other mental ability quarters were not significantly different in English or math. The gain by sex interactions were not significant in any of the three areas tested.

The summary of the significant differences for Cohort 2 is presented in Table 7.5. The mean achievement of the girls of Cohort 2, averaged across the three times of testing, was significantly higher than the mean of the boys in reading and English. The difference between the mean achievement of the boys and girls in math was not significant. The mean gain of the total students of Cohort 2 was significant from grade 10 to grade 11, grade 11 to grade 12, and from grade 11 to grade 12 in reading and English. The gain in math from grade 10 to grade 11 and from grade 10 to grade 12 was significant but the gain from grade 11 to grade 12 was not. The four quarters in mental ability gained equally across the three times of testing. Relative to the significant gain by sex interaction, the females gained more in

Table 7.5. Significant Differences (ANOVA $p \leq .05$) in Educational Achievement, Gain from Grade 10 to Grade 11 to Grade 12, and Post-hoc Comparisons for Longitudinal Cohort 2: Hood River Valley High School

	Sex(S)	Gain(G)	G X S	G X Q	G X S X Q
Reading	.044[1]	<.001[2]	NS	NS	NS
English	<.001[1]	<.001[2]	.005[4]	NS	NS
Math	NS	<.001[3]	.037[5]	NS	NS

[1] The mean achievement of the females was significantly higher than the mean of the males.

[2] The gains from Grade 10 to Grade 11, from Grade 10 to Grade 12, and from Grade 11 to Grade 12 were statistically significant.

[3] The gains from Grade 10 to Grade 11 and from Grade 10 to Grade 12 were statistically significant.

[4] The females gained significantly more than the males from Grade 10 to Grade 12 and from Grade 11 to Grade 12.

[5] There were no statistically significant pair-wise comparisons.

English than the males from grade 11 to grade 12 and from grade 10 to grade 12. The gain by sex interaction was not significant for reading and, although significant for math, the difference between any two times of testing was not significant.

Comparison of the Achievements and the Gains of the Two Longitudinal Cohorts

The mean mental ability of Cohort 1 was 104.49 whereas that for Cohort 2 was 106.30. Analysis of covariance, with mental ability the covariate, was used in identifying the significance of the main effects and also in comparing the gains of the two successive cohorts. Table 7.6 indicates the significant differences (ANCOVA) for cohort, sex, gain, and interactions. The post-hoc comparisons are given in footnotes 3 and 4.

The mean achievement of Cohort 1 in reading, averaged across the three times of testing, was significantly higher than that of Cohort 2. The mean achievements of Cohort 1 were not significantly higher or lower than those of Cohort 2 in English or math. The mean achievement of the girls, of the two cohorts combined, averaged across the three times of testing, was significantly higher than the mean of the boys in reading and English and not significantly different in math. The students of the two cohorts combined gained significantly across the

Table 7.6. Significant Differences (ANCOVA $p \leq .05$) in Educational Achievement, Gain from Grade 10 to Grade 11 to Grade 12, and Post-hoc Comparisons for Two Longitudinal Cohorts: Hood River Valley High School

	Cohort(C)	Sex(S)	S X C	Gain(G)	G X C	G X S	G X C X S
Reading	.020[1]	.028[2]	NS	<.001	NS	NS	NS
English	NS	<.001[2]	NS	<.001	.005[3]	NS	.004[4]
Math	NS	NS	NS	<.001	NS	NS	NS

[1] The mean achievement of Cohort 1 was significantly higher than the mean of Cohort 2.

[2] The mean achievement of the females was significantly higher than the mean of the males.

[3] Cohort 1 gained significantly more than Cohort 2 from Grade 10 to Grade 11; Cohort 2 gained significantly more than Cohort 1 from Grade 11 to Grade 12.

[4] The females of Cohort 2 gained more than the males from Grade 10 to Grade 12 and from Grade 11 to Grade 12; the males of Cohort 1 were about equal to the females from Grade 10 to Grade 12 and gained more than the females from Grade 11 to Grade 12.

three times of testing in all three areas tested. Regarding the significant gain by cohort interaction, Cohort 1 gained more in English than Cohort 2 from grade 10 to grade 11, while Cohort 2 gained more in English from grade 11 to grade 12. The two cohorts gained equally in reading and math.

No sex by gain interaction was significant; but there was one significant gain by cohort by sex interaction. Cohort 1 males and females gained about the same in English from grade 10 to grade 12 but the males gained more than the females from grade 11 to grade 12; the females of Cohort 2 gained more than the males from grade 10 to grade 12 and from grade 11 to grade 12.

Information on Students Not Included in Either Longitudinal Cohort

The grade 11 students of 1977-78, the grade 12 students of 1977-78, and the grade 12 students of 1978-79 are not included in Cohort 1. Similarly, the grade 10 students of 1979-80, the grade 10 students of 1980-81, and the grade 11 students of 1980-81 are not. The mean mental ability and the mean educational achievement of these groups are reported in tables in Klausmeier, Serlin, and Zindler (1982). This information may be of interest to the reader who wishes to compare the achievement of these groups with the achievements of Cohort 1 of Cohort 2.

Relationship of Changes in Educational Achievement to Implementation of Improvement Strategies and Unanticipated Events

One main objective of this cooperative research was to relate the changes in student achievement from year to year to the planned changes that the staff made annually in order to implement the three improvement strategies. As was explained in Chapter 2, the primary information regarding the changes in student achievement from year to year is drawn from the comparison of the achievements of each later grade 10, 11 and 12 group with the achievements of each earlier grade 10, 11, and 12 group. The second basis involves a comparison of the mean achievement of the first and second longitudinal cohorts. The rationale for using the mean achievements of the two cohorts, rather than the gains, was presented in Chapter 2.

It will be recalled that the 1977-78 testing was done in May. The results were tabled and interpreted by the staff during the first semester of the 1978-79 school year. Not until late in the first semester were any improvements planned and only minor ones could be implemented in the second semester. Accordingly, the comparisons of the achievements of the 1978-79 group of students with the 1977-78 group are treated as unrelated to planned improvements.

Table 7.7 provides a summary of the comparisons of the four successive grade 10, grade 11, and grade 12 groups with mental ability scores, the adjusted means, and the equivalent percentile ranks. The differences between the achievements of the 1977-78 and 1978-79 grade 10 groups were not significant in any area tested. The 1979-80 grade 10 group achieved significantly higher in all three areas than the 1977-78 and the 1978-79 groups. The 1980-81 grade 10 group achieved significantly higher than the 1977-78 group and not significantly different from the other two groups. These significantly higher achievements of the 1979-80 and 1980-81 grade 10 groups over the groups of the prior years are judged to have resulted from the following planned changes: (a) goal setting by the staff starting in 1979-80 to bring the mean achievement of each quarter of each grade up to the mean mental ability of each quarter and to provide a better educational program for the individual student with special attention given to students achieving below expectancy, (b) a program to improve reading achievement starting in 1978-79, (c) a required English 10 course starting in 1979-80, (d) a mathematics placement program starting in 1978-79, (e) advising of students regarding math courses by math teachers starting in 1980-81, and (f) requiring students to complete three units of a course rather than only one starting in 1980-81.

No difference in achievement between any pair of the first three grade 11 groups was significant. However, the mean reading, English, and mathematics achievement of the 1980-81 grade 11 group was significantly higher than that of each of the grade 11 groups of the three prior years, except English 1980-81 vs. 1978-79. The higher achieve-

Table 7.7. Summary of Findings Regarding Mean Achievement of Four Successive Grade 10, Grade 11, and Grade 12 Groups and Percentile Ranks Corresponding to Adjusted Means: Hood River Valley High School

	Comparisons of Successive Groups					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Grade 10						
Reading	NS	S+	S+	S+	NS	NS
English	NS	S+	S+	S+	NS	NS
Math	NS	S+	S+	S+	NS	NS
Grade 11						
Reading	NS	NS	S+	NS	S+	S+
English	NS	NS	S+	NS	NS	S+
Math	NS	NS	S+	NS	S+	S+
Grade 12						
Reading	NS	NS	NS	NS	NS	NS
English	NS	NS	NS	NS	NS	NS
Math	NS	NS	NS	NS	NS	NS

	Adjusted Means and Equivalent Percentile Ranks							
	1977-78		1978-79		1979-80		1980-81	
	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 10								
Reading	47.85	74	46.20	70	53.66	81	52.85	80
English	43.04	46	41.56	43	47.74	56	49.14	60
Math	25.99	54	24.50	49	29.43	64	28.91	62
Average Student N		195		160		173		132
Grade 11								
Reading	54.10	54	55.42	59	52.81	52	58.55	65
English	47.32	45	48.64	48	46.67	43	51.40	55
Math	29.49	56	30.18	58	30.00	58	32.88	66
Average Student N		151		169		113		156
Grade 12								
Reading	56.34	53	59.03	58	58.81	58	56.73	54
English	49.05	42	51.34	47	51.85	48	50.58	45
Math	30.64	53	32.39	59	32.00	58	31.66	56
Average Student N		116		137		145		110

S+ The mean achievement of the group of the later year was significantly higher than the mean of the group of the earlier year.

ments are related to the preceding planned changes made for grade 10 that were also made for grade 11. The fact that the 1979-80 grade 10 group achieved significantly higher than the 1977-78 grade 10 group while the 1979-80 grade 11 group did not achieve higher than the earlier grade 11 group is accounted for in terms of the cumulative effects of the planned changes. For example, the 1980-81 grade 11 group took the required English class when in grade 10 but the 1979-80 grade 11 group did not.

No difference in achievement between the successive grade 12 groups with mental ability scores was significant. This lack of significantly higher grade 12 achievement cannot be accounted for except that the 1980-81 grade 12 group did not experience any of the planned changes in the curriculum, advising, and instruction when in grades 10 and 11 that the 1980-81 grade 10 and grade 11 groups did.

The preceding significant differences in the mean achievements are reflected in the percentile ranks given in Table 7.7 for the successive grade 10, 11, and 12 classes. The fact that the increases from 1977-78 to 1980-81 for the grade 10 and 11 classes ranged from 6 to 14 percentile ranks merits recognition.

Table 7.8 presents a summary of findings regarding the two longitudinal cohorts. The mean achievement of Cohort 1 in reading, averaged across the three times of testing, was significantly higher than the means of Cohort 2. The differences between the two cohorts were not significant in English and math.

Table 7.8. Summary of Findings Regarding Mean Gain and Mean Achievement of Two Successive Longitudinal Cohorts: Hood River Valley High School

	Means of Each Cohort						Cohort with Higher Average Achievement
	Cohort 1			Cohort 2			
	$\bar{X}$ Gr. 10	$\bar{X}$ Gr. 11	$\bar{X}$ Gr. 12	$\bar{X}$ Gr. 10	$\bar{X}$ Gr. 11	$\bar{X}$ Gr. 12	
Reading	52.65	57.19	58.99	51.33	54.90	58.33	Coh. 1
English	47.26	51.07	51.54	47.34	49.13	51.98	NS
Math	29.13	31.91	32.21	29.22	32.24	33.01	NS
Student N	134			100			

Results Related to Student Attitudes

The IOX School Sentiment Index, Secondary Level, was administered to the students of grades 10, 11, and 12 in October of each year 1978-79 and 1979-80 and to a random sample of 10 boys and 10 girls from each grade in 1980-81. (There were 19, rather than 20, students from one grade.)

The inventory has seven subscales. Other items were constructed and interspersed in the scale to obtain student attitudes regarding their "Guide Group" activities. (Each student had a faculty guide or advisor; a group of students met with their guide on a regularly scheduled weekly basis.)

The student responded to each item of the inventory by indicating strong agreement, agreement, disagreement, or strong disagreement. A favorable response may involve agreement or disagreement, depending on the item's wording. A strong favorable response was scored 4 and a strong unfavorable response 1.

The students did not give their names on the answer sheets. Therefore, it cannot be determined whether some of the students who took the inventory in grade 10 also took it in grade 11 and grade 12. Moreover, only a random sample of 59 students of grades 10, 11, and 12 took the inventory in 1980-81, 20 from each of two grades and 19 from the other.

The mean rating for each of the eight subscales is given in Table 7.9. A few general trends are now presented.

First, the attitudes of the students of grade 10, grade 11, and grade 12 were very similar. Moreover, the attitudes of the students did not change much from one year to the next. The difference between any two grades and between any two years was typically under .10, a very small difference in terms of the size of the standard deviation units.

The mean ratings were typically above 2.40 and up to 2.53 on four scales, namely, learning, which was highest, teacher authority and control, teacher interpersonal relationships, and social structure and climate. The mean ratings for teacher mode of instruction ranged from 2.25 to 2.35, for peers from 2.11 to 2.27, for general from 2.13 to 2.24, and for the guide groups from 1.98 to 2.13. The standard deviation was very high for guide groups and the mean ratings were low, indicating a wide range in the ratings assigned by the students to the items of this scale.

These results regarding attitudes are not clearly relatable to the unanticipated events or to the planned changes. A specific planned change was to carry out activities starting in 1979-80 and continuing into 1980-81 to bring the mean rating on each subscale up to 2.50. However, the mean ratings of 1980-81 were about the same as the ratings for the earlier years.

Table 7.9. Attitudes of Students of Grades 10, 11, and 12 toward Various Aspects of Schooling: Hood River Valley High School

Subscale		Grade 10 78-79	Grade 10 79-80	Grade 11 78-79	Grade 11 79-80	Grade 12 78-79	Grade 12 79-80	1980-81 Combined Grades 10,11,12
1. Teacher: Mode of Instruction	Mean	2.28	2.28	2.35	2.34	2.25	2.30	2.31
	SD	.35	.33	.35	.37	.37	.38	.35
2. Teacher: Authority and Control	Mean	2.43	2.50	2.46	2.52	2.37	2.42	2.46
	SD	.37	.36	.38	.35	.39	.35	.38
3. Teacher: Interpersonal Relationships with Students	Mean	2.42	2.43	2.43	2.43	2.31	2.39	2.40
	SD	.44	.38	.45	.41	.46	.44	.45
4. Learning	Mean	2.50	2.53	2.49	2.52	2.49	2.48	2.51
	SD	.31	.30	.34	.31	.32	.33	.29
5. Social Structure and Climate	Mean	2.33	2.43	2.42	2.40	2.33	2.41	2.47
	SD	.33	.34	.35	.32	.34	.32	.35
6. Peer	Mean	2.19	2.27	2.25	2.24	2.11	2.23	2.27
	SD	.43	.42	.45	.45	.46	.38	.47
7. Guide Groups	Mean	2.09	1.98	2.13	2.00	2.05	2.07	2.14
	SD	.54	.55	.61	.57	.61	.63	.67
8. General	Mean	2.21	2.24	2.23	2.22	2.13	2.23	2.27
	SD	.39	.39	.47	.37	.46	.40	.40
	N	193	181	207	153	163	140	59

Conclusions

One purpose of the present research was to determine how well the Hood River Valley staff could implement the following improvement strategies: (a) arranging an appropriate total educational program of courses and other activities for each student, (b) arranging an appropriate instructional program in English, mathematics, and reading for each student each semester, and (c) setting goals for the students of each grade 10, 11, and 12 and planning and carrying out related improvement activities. Teacher advisors planned and monitored the individual educational programs of their advisees during the first two years of the project. This resulted in many students taking only one unit of five-unit courses and also not taking many advanced courses in English or mathematics. In 1979-80 the advising was changed so that English and mathematics teachers were involved in advising all students regarding English and mathematics courses. In 1980-81 all students were required to complete at least three units of each course that they started rather than being permitted to discontinue a course, even before completing one unit. Already in 1977-78, the teachers were arranging instructional programs for each student enrolled in their courses, especially to take into account differences among the students in the rate at which they achieved the objectives of the course. Changes were made in the instructional programming practices during each year, including 1980-81. Goal setting in English, mathematics, and reading, and carrying out related improvement activities were carried out in 1979-80 and in 1980-81. Accordingly, a considerable number of changes were made in implementing the educational programming and instructional programming strategies throughout the project.

Another objective of the research was to maintain a satisfactory level of achievement in English, mathematics, and reading from year to year and to raise achievement that was regarded as not satisfactory. The grade 10 class of 1980-81 achieved significantly higher than the classes of 1977-78 and 1978-79 in English, mathematics, and reading. The grade 11 class of 1980-81 achieved significantly higher than the classes of 1977-78 and 1979-80 in all three areas, and higher than the class of 1978-79 in reading and mathematics but not in English. The grade 12 class of 1980-81 did not achieve significantly different from any prior class. The second longitudinal cohort achieved significantly lower in reading than the first one and not significantly different in English and mathematics. Based on these findings we conclude that continuously refining the educational and instructional programming practices, combined with the implementation of the goal-setting strategy starting in 1979-80, was effective in producing higher student achievement in grades 10 and 11. The last grade 12 class did not achieve higher, apparently because many planned improvements did not start when the students were enrolled in grades 10 and 11.

The attitudes of the students toward school remained stable from the first year of testing in 1978-79 to 1980-81. The attendance of the students was about the same in 1980-81 as in 1977-78 as was the dropout rate; however, attendance declined and the dropout rate increased in 1979-80.

The negative results pertaining to the lower attendance and the higher dropout rate in 1979-80 are attributed mainly to placing higher demands on the students to achieve. The lack of a greater gain in positive attitudes may also be attributed to making greater demands to achieve and simultaneously decreasing the flexibility of the curricular and instructional arrangements. Unanticipated events, including a teacher strike and many changes in the staff in 1978-79, and the deepening recession in the forestry and lumber industry probably contributed to lack of more favorable student outcomes.

CHAPTER 8

SUMMARY AND DISCUSSION

This project included both development and research activities. The goal of the development was for each school to start or refine three improvement strategies and to start or refine school structures and processes that would enable it to implement the strategies. This is referred to as the development of the school's improvement capability. The research was conducted to determine the effects of implementing the improvement strategies on student outcomes. The effects of unanticipated events that occurred each year were also assessed, since they might have influenced student outcomes.

Both the development and research were based on a conceptual design for the improvement of secondary education that was formulated before the first data collection and data analysis were undertaken by the schools. The conceptual design incorporates the school structures and processes and also the improvement strategies that, if made operational, will result in the betterment of secondary schooling. Accordingly, the validity of the design as a conceptual framework for guiding the renewal and improvement activities of secondary schools was ascertained.

The research had four purposes, all related to the development of the school's improvement capability. One was for each school to maintain a satisfactory level of student achievement from year to year or to raise the level of student achievement where it was identified as unsatisfactory. Maintaining or raising achievement in English, mathematics, and reading was a common concern of the five schools, and it was the primary objective of the schools for conducting the research. A second purpose was to determine the extent to which each school could carry out its own data collection and data analysis and then plan and carry out improvement activities based on the results of the data analysis. The improvement activities of each school were related to its implementation of three improvement strategies: individual educational programming, individual instructional programming, and goal setting. A third objective was to relate the changes that occurred in student achievement from year to year to the implementation of the improvement strategies and to unanticipated events that occurred and that influenced student achievement. The fourth objective was to relate the organization structures and processes of each school to its implementation of the strategies.

The conceptual design for improving secondary education was presented in Chapter 1 and the research methods and procedures were explained in Chapter 2. In Chapters 3 through 7, the findings pertaining to the preceding purposes were presented for each of the five schools that participated in the research. In this chapter the purposes and methods of the study are highlighted first. Then, the findings across the five schools regarding sex differences in achievement and gains in achievement, and differences among the four quarters in mental ability are brought together and discussed. This is followed with conclusions regarding the implementation of the improvement strategies by each school and the school structures and processes that facilitated the implementation of the strategies. These conclusions are related to the recent school effectiveness literature. Next, the cooperative improvement-oriented research method developed and used in the present project is summarized and related to other methods of educational research. Concluding observations are then offered.

Participating Schools and Data Gathered by Each School

Steuben Middle School is an inner-city school of Milwaukee that had an average annual enrollment of about 850 students in grades 7 and 8 combined. About half of the student population is black and the other half is white, including Hispanic. Its academic teachers and students were organized into groups, called Instruction and Advising (I & A) Units. The typical I & A Unit had four teachers and 120 students.

The Metropolitan Achievement Test was administered annually in the spring to all the students of the school. The Otis-Lennon Test of Mental Ability was administered annually in grade 5. Other information collected annually on the students included attendance each year and self-concepts and attitudes the last three years.

Webster Transitional School is a suburban school of grades 6, 7, and 8 with a predominantly white student population. The enrollment declined from 761 in 1977-78 to 712 in 1980-81. The academic teachers and students were organized into I & A Units that varied in number and composition from the first to the last year as the enrollment declined. The typical I & A Unit of the last year had three teachers and 75 students.

A locally constructed language arts test, a locally constructed mathematics test, and the Gates-MacGinitie Reading Tests were administered. The locally constructed tests were administered in the fall, the spring, or both while the Gates-MacGinitie Tests of Reading were administered only in the spring of each year. The Short Test of Educational Ability was administered in grade 7.

The test scores of individual students were available for final analysis for grade 6 starting in 1977-78, grade 7 in 1978-79, and grade 8 in 1979-80. Information regarding student attendance was gathered all four years, and student attitude information was gathered annually for the last three years.

Carl Sandburg Junior High School is a rural, suburban junior high school of grades 7 and 8 with a predominantly white student population.

Its total enrollment was 388 in 1977-78 and 322 in 1979-80. Its academic teachers and students were organized into I & A Units. It changed its achievement test battery in 1980-81. Accordingly, the data were analyzed only through 1979-80.

The students were administered the Metropolitan Achievement Test annually in the spring. Information on student attendance and student attitudes was gathered annually.

Cedarburg High School is a suburban high school of grades 9 through 12 with a predominantly white student population. Its enrollment dropped from 1376 to 1214 in the four years of the project. Starting with the grade 9 class of 1977-78, its teachers and students were either in a beginning continuous educational progress program, called PACE, or in a traditional program that was continued from the prior year. The grade 9 PACE students and their academic teachers were organized into an I & A Unit consisting of four academic teachers and 100 students. The same organizational pattern was employed in grade 10 in 1978-79 and thereafter and in grade 11 in 1979-80 and 1980-81. In grades 9 and 10 the four academic teachers taught the PACE students English, math, science, and social studies in classes only for the PACE students. In grade 11, only part of the PACE students were taught in PACE classes, mainly English and social studies.

The Short Test of Educational Ability was administered in grade 9 annually. The Iowa Tests of Educational Development were administered in October to all the grade 9 students in 1977-78, the grade 9 and 10 students in 1978-79, the grade 9, 10, and 11 students in 1979-80, and the grade 9, 10, 11, and 12 students in 1980-81. Information regarding student attendance, attitudes, and dropouts was gathered for the students when in these same grades.

Hood River Valley High School is a rural, small town high school of grades 10, 11, and 12. A small percentage of its students are Oriental and the remainder are white. Its enrollment during the four years of the study dropped from 785 to 607. Its teachers were organized into broad curricular fields.

The Stanford Test of Academic Skills was administered annually in the spring to all the students. The General Aptitude Test Battery was administered to the students when in junior high school in grade 9. Information was gathered annually in Hood River Valley High School on attendance and dropouts each year and on student attitudes the last three years.

In addition to the preceding information regarding student outcomes, each school provided the project information regarding its planned improvements each year, non-focused planned changes that were made each year, and unanticipated events that occurred. The project director used this information in relating changes in these processes and events to the changes in student outcomes.

Research Method

A four-phase research method was employed. The first phase involved the formulation and initial validation of a conceptual design for the improvement of secondary education. In the second phase each school collected educational achievement information on all its students annually and analyzed this information descriptively, along with the available mental ability scores of the students. The school used the results of this annual data analysis in identifying subject fields, grade levels, and quarters of the students in mental ability for whom achievement was lower than desired. Improvement goals were then set to raise the achievement level of the low quarters and to maintain the level of the quarters that were satisfactory.

As noted, each school had a mental ability score and an achievement test profile for each student. This information was used to identify the student whose achievement percentile rank in any subject field was above or below the mental ability percentile rank. This and other information was used by the advisor in planning the educational program of the student and also by teachers in arranging an appropriate instructional program for the student in each course included in the student's educational program.

In the third phase of the research, the project analyzed the data on each student after the last data had been collected. In one kind of analysis, the achievements of the students of the same grade in school were compared, for example, the four grade 7 classes of Steuben Middle School. This analysis is referred to as cross-sectional and the groups of students are referred to as successive grade 7 classes. Analysis of covariance, with mental ability the covariate, was used in the cross-sectional analysis of the data to take into account differences in mental ability among the successive classes and between the males and females. Where a difference among three or more means was found to be significant at or beyond the .05 level, post-hoc comparisons were made of each pair of means.

A longitudinal cohort consisted of a group of students who entered the first grade of a school, took all the tests, and remained through the last grade. Repeated measures analysis of variance was used in analyzing the data of each longitudinal cohort. Comparisons were made of the achievements of the quarters in mental ability and of the males and females, averaged across the times of testing. The gain among the quarters in mental ability and between the males and females was also compared. Where a difference significant at or beyond the .05 level was found among three or more mean gains, post-hoc comparisons were made to determine the significance of the difference of the gain between each two times of measurement.

Each school had two or three longitudinal cohorts during the four years of the project. The mean achievements of the cohorts and of the males and females, averaged across the times of testing, were compared. The gain of the two cohorts between the times of testing were also compared. Analysis of covariance, with mental ability the covariate, was used to determine the significance of difference among means. Accordingly, the achievements and the gains of the quarters in mental ability could not be compared. (The longitudinal data from Cedarburg High School was not analyzed in this manner for reasons to be indicated later.)

The data regarding student attitudes, attendance, and dropouts were analyzed, using descriptive statistics. Tests of statistical significance were not made.

In the last phase of the research, the project director related the changes in student outcomes that occurred from year to year to the implementation of the improvement strategies and to the unanticipated events that occurred. Causal inferences were drawn. Each school reviewed the relationships and the causal inferences.

Improvement Strategies

Three closely related improvement strategies were worked out by the schools and the project director: individual instructional programming, individual educational programming, and goal setting. The implementation of two or three of these strategies was either started or refined by each school at some time during the four years of the project.

The individual instructional programming strategy was employed at the classroom level. It could be implemented without implementing either of the other two strategies. This strategy called for the teacher to take into account each student's achievement level in relation to mental ability and the student's motivation, learning styles, and other characteristics. This information was used by the teacher in determining the amount of time the student should spend in and out of class on required learning activities, the proportion of individual, small-group, and large-group instruction the student should receive, the amount of attention the student should get from the teacher, and similar classroom processes that should be used.

Individual educational programming called for an advisor to plan an appropriate program of courses and other educational activities with each advisee each semester, to monitor the student's progress during the semester, and to evaluate the program. The student's career goals as well as other characteristics mentioned earlier were considered. An effective educational program could not be implemented for a student unless the student's instructional program in each course was effective. Similarly, the student could not receive effective instructional programming in a course that was unsuited to the student's learning capabilities, career goals, and other characteristics. However, individual educational programming could be implemented without implementing goal setting for a group of students.

The third strategy was to set goals for the total group of students of a grade, or for certain quarters of a grade in mental ability, and to plan and carry out improvement activities to achieve the goals. The goals were based on the analysis of the achievement and other data gathered by the school. The utilization of this strategy called for the implementation of one or both of the preceding strategies. However, more than this was required, for example, when the curriculum was not appropriate for some of the students, when an insufficient amount of time for instruction was allocated to a particular subject field, or when other school conditions did not permit achievement of a goal.

Certain school-organization structures and processes facilitated the implementation of the goal-setting strategy and also the preceding strategies. These structures and processes are presented and discussed later in the chapter.

Sex Differences in Achievement

The importance of promoting high achievement by both boys and girls in all subject fields is well recognized. Despite this, differences between the sexes in achievement in English, mathematics, and reading are often found at the middle school and high school levels. It is possible that these differences are decreasing as schools give more attention to eliminating sex discrimination.

In the present project differences in the mean achievements of boys and girls of each school were identified. It was assumed that any differences found between the sexes in mean achievement were not related to the improvement strategies employed in the schools. Similarly, it was assumed that any differences in the gains of the boys and girls were not caused by the implementation of the improvement strategies or by the unanticipated events. On the other hand, it might be expected that implementing the individual instructional programming strategy and the individual educational programming strategy equally effectively with boys and girls would reduce sex differences in achievement.

Mean Achievement

Standardized educational achievement tests were used in four of the participating schools, whereas in Webster Transitional School locally constructed tests were used in all areas except reading. So that the results here can be related to other reports of sex differences that employ published tests, the summary of the differences between the males and females is limited to the first four schools.

Table 8.1 provides a summary of the significant differences (ANCOVA, $p \leq .05$) in educational achievement between the males and females of grades 7 and 8 of Steuben Middle School and Carl Sandburg Junior High School. Two separate analyses were performed on the data from each school, the first for the total number of boys and the total number of girls of all the grade 7 classes combined and the second for

Table 8.1. Summary of Significant Differences (ANCOVA) in Educational Achievement between Males and Females of Grades 7 and 8 of Steuben Middle School and Carl Sandburg Junior High School

	STEUBEN MIDDLE SCHOOL										CARL SANDBURG JUNIOR HIGH SCHOOL									
	Grade 7					Grade 8					Grade 7					Grade 8				
	Males		Females		Sex Differences	Males		Females		Sex Differences	Males		Females		Sex Differences	Males		Females		Sex Differences
	N	$\bar{X}$	N	$\bar{X}$	P	N	$\bar{X}$	N	$\bar{X}$	P	N	$\bar{X}$	N	$\bar{X}$	P	N	$\bar{X}$	N	$\bar{X}$	P
Word Knowledge	541[1]	23.62	608	22.68	.015[3]	446[1]	28.17	518	26.93	.003[3]	256[2]	91.90	227	92.02	.824	278[2]	96.40	229	96.10	.834
Reading	542	19.12	608	18.88	.651	446	22.93	519	22.38	.170	256	90.89	227	92.66	.044[4]	280	95.75	228	97.03	.211
Reading Total	539	42.81	608	41.58	.093	445	51.12	518	49.29	.012[3]	256	92.41	227	93.46	.160	278	97.50	228	97.95	.552
Language	543	40.44	603	43.25	<.001[4]	448	44.46	512	47.77	<.001[4]	255	93.06	226	98.19	<.001[4]	278	98.23	227	101.89	<.001[4]
Spelling	535	26.33	600	27.69	<.001[4]	447	28.14	514	30.32	<.001[4]	253	94.30	226	98.47	<.001[4]	285	96.58	228	102.19	<.001[4]
Math Computation	537	21.19	603	21.80	.098	438	23.57	514	23.43	.518	253	95.90	226	98.68	.002[4]	285	98.74	228	100.48	.034[4]
Math Concepts	534	19.56	600	19.27	.350	436	22.20	514	22.03	.578	253	89.33	226	90.89	.057[4]	285	91.59	228	91.78	.844
Math Problem Solving	532	16.07	602	15.57	.024[3]	431	18.89	514	18.02	.005[3]	253	95.76	226	97.08	.133	285	98.69	228	98.75	.970
Math Total	529	56.94	600	56.72	.684	429	64.88	508	63.69	.136	253	98.78	226	100.77	.012[4]	285	101.49	228	102.42	.234
Science											258	97.15	227	95.09	.002[3]	281	100.47	227	96.71	<.001[3]
Social Studies											258	95.16	229	94.81	.584	281	98.99	227	97.73	.135

[1] The N is the total number tested in four years.

[2] The N is the total number tested in three years.

[3] The mean of the males was significantly higher than the mean of the females.

[4] The mean of the females was significantly higher than the mean of the males.

the grade 8 classes combined. All students were included who took one or more achievement tests and who also had a mental ability score. Accordingly, the number of students of each grade varies from one achievement test to another. The data were combined for the grade 7 classes and for the grade 8 classes in order to assure that the findings would be generalizable to the population of students of each school. (The same procedure for selecting students was followed for the two high schools.)

The Metropolitan Achievement Test was used in both schools; however, the raw scores of Steuben Middle School and the standard scores of Carl Sandburg were analyzed. The means and the levels of significance are given in Table 8.1 so that the direction of the difference favoring either sex as well as the level of significance may be observed. In the following discussion, attention is given to the consistencies and the inconsistencies between the two schools regarding the sex differences significant at or beyond the .05 level. It is important to recall that the discussion here pertains to mean achievement averaged across the same grade, not to gain of the same students from one time of testing to the next.

Consistent results were found in language and spelling in both grades 7 and 8 in both schools; the mean of the females was significantly higher than the mean of the males.

The results between the two schools are inconsistent for the three subscores in reading. The males of Steuben achieved significantly higher than the females in grade 7 and grade 8 in word knowledge and in grade 8 in reading total; at Sandburg the only significant difference was in the reading subtest in grade 7, and the females achieved significantly higher than the males.

The results between the two schools are inconsistent in certain mathematics subtests. The females of both grades 7 and 8 at Sandburg achieved significantly higher in math computation than the males; whereas the differences were not significant for either grade at Steuben. In math problem solving the males of grade 7 and grade 8 of Steuben achieved significantly higher than the females; whereas the differences at Sandburg were not significant. Related to math total the differences were not significant at Steuben for either grade; however, at Sandburg the mean of the females in grade 7 was significantly higher than the mean of the males.

The social science and social studies tests were not administered at Steuben. At Sandburg the males achieved significantly higher than the females in grades 7 and 8 in science, whereas the differences between the sexes in social studies were not significant in either grade.

Table 8.2 presents the summary of the significant sex differences at Cedarburg High School and at Hood River Valley High School. The results are based on the Iowa Tests of Educational Development at Cedarburg and on the Stanford Test of Academic Skills at Hood River Valley. Accordingly, one cannot infer that the tests were measuring

Table 8.2. Summary of Significant Differences (ANCOVA) in Educational Achievement between Males and Females of Different Grades of Cedarburg High School and Hood River Valley High School

	Grade 9					Grade 10					Grade 11					Grade 12				
	Males		Females		Sex Main Effect	Males		Females		Sex Main Effect	Males		Females		Sex Main Effect	Males		Females		Sex Main Effect
	N	X̄	N	X̄	P	N	X̄	N	X̄	P	N	X̄	N	X̄	P	N	X̄	N	X̄	P
CEDARBURG HIGH SCHOOL																				
Comprehension	522[1]	14.23	521	15.03	<.001[4]	384[1]	15.87	381	17.01	<.001[4]	234[1]	16.72	224	17.82	.019[4]	123[1]	16.02	100	17.46	.081
Vocabulary	522	15.08	521	15.30	.387	384	16.93	381	16.87	.941	234	17.42	224	18.36	.072	123	18.04	100	19.41	.153
Reading Total	522	14.08	521	14.58	.014[4]	384	15.85	381	16.48	.014[4]	234	16.73	224	17.66	.044[4]	123	16.88	100	18.17	.090
Usage	522	14.15	521	16.14	<.001[4]	384	15.79	381	17.88	<.001[4]	234	15.62	224	18.42	<.001[4]	123	15.60	100	17.93	.004[4]
Spelling	522	12.98	521	15.81	<.001[4]	384	14.73	381	17.65	<.001[4]	234	15.75	224	19.04	<.001[4]	123	15.27	100	18.42	<.001[4]
Language Total	522	13.69	521	16.12	<.001[4]	384	15.43	381	17.98	<.001[4]	234	15.86	224	19.00	<.001[4]	123	15.58	100	18.50	<.001[4]
Math	522	14.15	521	12.89	<.001[3]	384	16.28	381	14.82	<.001[3]	234	17.02	224	16.16	.012[3]	123	17.63	100	16.24	.031[3]
Social Studies	522	13.56	521	13.60	.801	384	15.68	381	15.64	.750	234	16.41	224	16.68	.884	123	16.53	100	17.28	.523
Science	522	15.88	521	15.16	.005[3]	384	18.31	381	17.68	.011[3]	234	19.08	224	18.47	.101	123	16.55	100	17.27	.418
Use of Sources	522	15.48	521	16.87	<.001[4]	384	16.16	381	17.40	<.001[4]	234	16.04	224	18.61	<.001[4]	123	15.43	100	18.14	.023[4]
HOOD RIVER VALLEY HIGH SCHOOL																				
Reading						333[2]	48 87	327	51.10	.002[4]	297[2]	54.78	292	56.05	.061	247[2]	56.01	261	59.60	<.001[4]
English						333	41.91	327	48.42	<.001[4]	297	45.38	292	52.00	<.001[4]	247	46.65	261	54.73	<.001[4]
Math						333	26.79	327	27.45	.161	297	30.38	292	30.99	.222	247	31.11	261	32.30	.068

[1] The N is the total number tested in all years and includes both PACE and traditional students. There were four Grade 9, three Grade 10, two Grade 11 classes, and one Grade 12 class.

[2] The N is the total number tested in three years. Hood River Valley High School has no Grade 9.

[3] The mean of the males was significantly higher than the mean of the females.

[4] The mean of the females was significantly higher than the mean of the males.

the same achievement. The three most comparable test areas are reading total, language total, and math at Cedarburg High School and reading, English, and math at Hood River Valley High School. Although differences related to other test areas at Cedarburg High School are interesting, the present discussion is limited to these three most comparable ones.

The means of the females of grades 9, 10, 11, and 12 of Cedarburg High School were significantly higher than the means of the boys in reading total and in language total with one exception, namely, the difference was not significant in reading total in grade 12. In a parallel manner, the means of the girls of grades 10, 11, and 12 of Hood River Valley were significantly higher than the means of the boys in reading and in English with one exception, namely, the mean in reading of the girls of grade 11 was not significantly higher at the .05 level (it was at the .06 level).

The difference between the sexes in mathematics was inconsistent for the two high schools. The mean of the boys of Cedarburg High School was significantly higher than the mean of the girls in all grades in mathematics; but at Hood River Valley High School the differences were not significant in any grade and the obtained means of the females were higher than the means of the males in grades 10, 11, and 12.

Sex Differences in Gain in Achievement

Did the differences between the males and females remain constant from grade to grade? This question was answered by analyzing the significant gain by sex interactions of the longitudinal cohorts of the four schools. The summary of the significant gain by sex interactions related to the nine areas tested for three longitudinal cohorts of Steuben and two longitudinal cohorts of Carl Sandburg are given in Table 8.3. Of 27 possible gain by sex interactions at Steuben Middle School, that is, nine for each of three cohorts, only three were found to be statistically significant. The girls of Cohort 3, but not of the other two cohorts, gained significantly more than the boys in reading from grade 7 to grade 8. The girls of Cohort 1, but not of the other two cohorts, gained more from grade 7 to 8 in spelling, while the girls of Cohort 2 gained more than the boys from grade 7 to 8 in math concepts. The differences in the gains of the boys and girls were not significant for any cohort in word knowledge, reading total, language, math computation, math problem solving, and math total.

There were 18 possible significant gain by sex interactions for the two longitudinal cohorts at Carl Sandburg Junior High School. Only two were found to be significantly different. The girls of Cohort 2 gained significantly more than the boys from grade 7 to grade 8 on the reading subtest and also in reading total. Based on these results from both schools it appears that the gains in achievement in all subject areas are much the same for boys and girls from

Table 8.3. Summary of Significant Gain by Sex Interactions (ANCOVA) of Three Longitudinal Cohorts of Steuben Middle School and Two Longitudinal Cohorts of Carl Sandburg Junior High School

		COHORT 1					COHORT 2					COHORT 3				
		Grade 7		Grade 8		Gain X Sex	Grade 7		Grade 8		Gain X Sex	Grade 7		Grade 8		Gain X Sex
		$\bar{X}$	SD	$\bar{X}$	SD	P	$\bar{X}$	SD	$\bar{X}$	SD	P	$\bar{X}$	SD	$\bar{X}$	SD	P
STEUBEN[2]																
Reading	Males	21.87	8.37	24.82	9.01	.735	18.00	8.48	22.49	9.26	.748	19.70	8.70	22.93	8.94	<.001[1]
	Females	20.76	8.80	23.60	9.33		17.38	7.47	22.07	8.95		19.25	8.55	23.07	8.56	
Spelling	Males	26.74	7.61	29.08	6.73	.034[1]	26.69	7.26	28.54	7.69	.268	25.54	6.88	30.22	6.24	.066
	Females	26.96	6.31	30.83	6.07		27.99	7.20	30.50	6.51		27.81	7.21	31.06	6.35	
Math Concepts	Males	18.82	7.57	23.65	7.86	.265	19.65	7.09	22.26	7.62	.017[1]	21.80	6.50	23.73	7.02	.873
	Females	18.45	5.78	22.48	7.46		18.33	7.07	22.32	6.94		20.78	6.29	22.64	6.57	
N	Males	97					106					96				
	Females	94					141					120				
SANDBURG[3]																
Reading	Males	91.86	15.19	97.38	15.74	.857	90.72	15.72	96.13	16.53	.024[1]					
	Females	91.83	11.61	97.76	12.40		91.32	17.26	100.08	14.75						
Reading Total	Males	93.31	13.26	98.77	14.79	.343	91.24	14.12	96.52	15.07	.009[1]					
	Females	93.05	11.55	99.62	12.31		93.10	14.92	100.95	14.19						
N	Males	78					71									
	Females	58					63									

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[1] Females gained significantly more than males.

[2] There were no significant differences between males and females of any cohort at Steuben in Word Knowledge, Reading Total, Language, Math Computation, Math Problem Solving and Math Total.

[3] There were no significant differences between males and females of either cohort at Sandburg in Word Knowledge, Language, Spelling, Math Computation, Math Concepts, Math Problem Solving, Math Total, Science and Social Studies.

grade 7 to 8 except in reading where there is a tendency for the girls to gain more than the boys.

Table 8.4 presents a summary of the significant gain by sex interactions of two PACE longitudinal cohorts and two traditional longitudinal cohorts of Cedarburg High School and two longitudinal cohorts of Hood River Valley High School. The results for 10 areas of testing are given for Cedarburg and for three at Hood River Valley. Of 20 possible significant gain by sex interactions involving the PACE cohorts only one was found to be significant. Here the males of Cohort 2 gained more than the females from grade 10 to 11 in science. Of the possible 20 statistically significant gain by sex interactions involving the traditional cohorts, only two were found significant. The females of Cohort 2 gained more than the males in language total from grade 10 to grade 11. Although there was a significant gain by sex interaction for Cohort 1 related to use of sources, the difference in the gain between any two grades was not significant.

Two of a possible six statistically significant gain by sex interactions were found for the two longitudinal cohorts of Hood River Valley High School. The girls of Cohort 2 gained more from grade 10 to grade 12 and grade 11 to grade 12 in English than did the boys. The mean gain made by the girls of Cohort 2 in mathematics was greater than that by the boys; however, the difference in the amount of gain made by the boys and girls from any one grade to the next was not significant.

Based on the very few significant gain by sex interactions at the high school level, we infer that boys and girls gain about equally from one grade to the next in reading and mathematics. The only exception is that girls tend to gain more in the language arts--English area.

Related to the patterns of gains in all subject fields from grade 7 through 12, we infer that the boys and girls gain equally from one grade to the next except for reading from grade 7 to grade 8 and English from grade 9 through 12. Clearly, the boys did not gain more than the girls in mathematics from grade 7 to grade 8 or during the high school years.

The preceding results regarding the differences between the mean achievements and mean gains of the males and the females may be related to other research findings. Maccoby (1966) reviewed approximately 1600 studies on educational and psychological differences between males and females. Subsequently, Maccoby and Jacklin (1974) arrived at conclusions of three kinds regarding sex differences: widely confirmed differences, questionable differences, and unfounded myths about differences. Block (1976) examined the same studies and other information. She confirmed some of the conclusions of Maccoby and Jacklin and drew others. The three "confirmed" differences of Maccoby and Jacklin regarding academic aptitudes that Block agreed with follow (Block, 1976, p. 307). First, the mean verbal ability of girls is higher than the mean of boys. This higher verbal ability should be reflected in higher achievement in areas such as reading, vocabulary,

Table 8.4. Summary of Significant Gain by Sex Interactions (ANCOVA) of Two Longitudinal Cohorts of Cedarburg High School and Two Longitudinal Cohorts of Hood River Valley High School

		GRADE 9						GRADE 10				GRADE 11				GRADE 12				
		Males			Females			Males		Females		Males		Females		Males		Females		Gain X Sex
		$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	P
CEDARBURG[2]																				
PACE																				
Science	Cohort 1[1]	15.31	5.96	29	16.63	4.86	32	18.21	5.26	18.44	5.25	19.93	6.20	20.66	4.88	17.41	8.08	19.56	5.00	.396[4]
	Cohort 2[1]	16.84	4.52	44	14.98	4.47	43	19.98	4.57	19.91	3.88	21.22	4.00	19.26	3.37					.009
Traditional																				
Language Total	Cohort 1	12.37	4.33	73	14.41	4.29	49	14.03	5.20	16.90	4.14	14.45	5.65	17.16	4.41	14.89	6.42	17.67	5.30	.474[5]
	Cohort 2	13.67	3.57	55	15.89	3.89	75	15.55	3.39	17.16	3.83	16.85	4.72	19.61	4.15					.049
Use of Sources	Cohort 1	13.42	4.94		14.43	5.27		14.03	6.50	16.33	4.90	13.99	6.54	17.00	5.91	14.40	8.13	17.92	7.35	.042[6]
	Cohort 2	15.71	5.13		17.01	4.39		16.40	5.52	16.84	4.66	16.78	6.38	19.08	5.30					.051
HOOD RIVER VALLEY[3]																				
English	Cohort 1			67			67	43.28	13.94	51.24	10.89	46.58	13.13	55.57	10.32	47.64	13.73	55.43	10.65	.308[7]
	Cohort 2			50			50	44.36	14.44	50.32	9.17	46.12	13.12	52.14	10.03	47.10	14.03	56.86	7.94	.005
Math	Cohort 1							28.28	10.86	29.99	8.34	30.85	10.93	32.97	9.14	31.24	10.98	33.18	10.14	.885[6]
	Cohort 2							29.54	10.11	28.90	8.79	32.86	10.09	31.62	9.44	32.26	10.96	33.76	9.00	.037

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[1] Cohort 1 included Grades 9 through 12; Cohort 2 Grades 9 through 11.

[2] There were no significant differences at Cedarburg between PACE males and females of either cohort in Comprehension, Vocabulary, Reading Total, Usage, Spelling, Language Total, Math, Social Studies, and Use of Sources. There were no significant differences at Cedarburg between traditional males and females of either cohort in Comprehension, Vocabulary, Reading Total, Usage, Spelling, Math, Social Studies, and Science.

[3] There was no significant difference at Hood River between males and females of either cohort in Reading. Hood River does not have a Grade 9.

[4] Males gained more than females from Grade 10 to Grade 11.

[5] Females gained more than males from Grade 10 to Grade 11.

[6] There were no significant pairwise comparisons.

[7] The females gained more than the males from Grade 10 to Grade 12 and from Grade 11 to Grade 12.

comprehension, and spelling. Second, the mean visual-spatial ability of boys is higher than the mean of girls. Third, the mean quantitative ability of boys is higher than the mean of girls. These higher visual-spatial and mathematical abilities should be reflected in higher achievement in areas such as mathematical concepts and mathematical problem solving. Block (1976) also found that these differences become more pronounced with increasing age from early childhood through adolescence.

A more recent report indicates that about 1,000,000 high school students took the Scholastic Aptitude Test in 1980; 51.8% of them were females. The mean verbal and mathematical aptitude scores of the boys and the girls of 1980 and also those of 1970 and 1975 follow (Educational Testing Service, 1980, p. 5):

Mean Scholastic Aptitude Test Scores of
High School Boys and Girls

	Verbal Aptitude			Mathematical Aptitude		
	Male	Female	Difference	Male	Female	Difference
1970	459	461	+2F	509	465	-44F
1975	437	431	-6F	495	449	-46F
1980	428	420	-8F	491	445	-46F

Notice that the mean verbal aptitude of the girls was slightly lower than the mean of the boys in 1975 and 1980, whereas the mean mathematical aptitude of the boys was considerably higher for all three years.

A smaller group of the high school girls and boys took the Test of Standard Written English, an achievement test. The girls' mean was higher than that of the boys in 1980, but the difference between the girls and boys narrowed from 1975 to 1980, as is shown in Figure 8.1

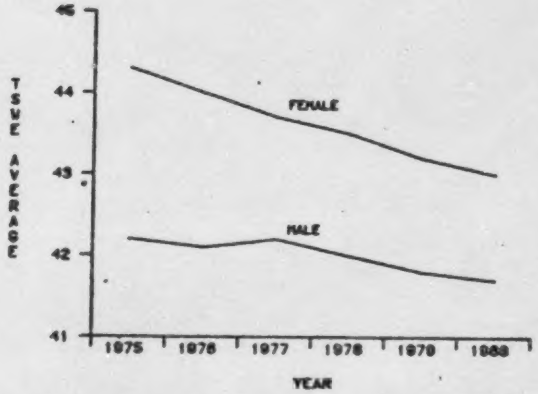

Figure 8.1 Means of boys and girls on test of standard written English. (From: Educational Testing Service, 1980, p. 5.)

(Educational Testing Service, 1980, p. 5). We should note before proceeding further that this test and the SAT discussed earlier were administered to high school students who intended to go to college after graduation, not to the total student body of the schools, as was done in the present project.

Fennema and Sherman (1978) did not find a significant sex difference in mathematics achievement in grade 8. However, a significant difference was found in grade 11 favoring the boys (Sherman, 1980). A significant difference in visual spatial ability between the girls and the boys was found in grade 8 and also in grade 11, favoring the boys. Sherman (1980) concluded that the difference between the boys and girls in mathematics achievement that developed from grade 8 to grade 11 was partially determined by the sex-related difference in spatial ability but also by sociocultural influences that assign mathematics as a male domain. One indicator of the sociocultural influence was that the girls had a much sharper decline than the boys in favorable attitudes toward mathematics from grade 8 to grade 11. This finding of a sex related, sociocultural factor as a determinant of girls' lower math achievement and interest in math confirmed earlier results found by Sherman and Fennema (1977).

It is interesting to note that in the present project (a) no significant sex differences in math total were found in either school in grade 7 or grade 8 except in grade 7 of Carl Sandburg Junior High School where the mean of the girls was significantly higher, (b) the boys of Cedarburg High School achieved significantly higher in math in all four grades while the difference between the boys and girls at Hood River Valley was not significantly different in grade 10, 11, or 12 and (c) there was no significant sex difference in the amount of gain favoring the boys from grade 7 to grade 8 in either school, from grade 9 to grade 12 at Cedarburg, or from grade 10 to grade 12 at Hood River Valley High School. These findings are not in harmony with those of Sherman and Fennema. However, the lack of a significantly higher gain in mathematics by the boys during the high school years may be due to the instructional and educational programming strategies used in the present study.

When the results related to English, reading, and mathematics from all the prior sources including the present project are combined, we conclude that the mean achievement of girls is significantly higher than that of the boys in spelling and language usage in grades 7 and 8 and in English and reading from grade 9 onward through grade 12. The mean of the boys is not always significantly higher than that of the girls in mathematics in any grade, 7 through 12, although most studies indicate higher achievement in high school.

The discrepancies among the findings of the various studies imply that the differences in the characteristics of the particular samples of students, differences in the tests that are used, and other factors, including instruction and advising, determine whether the average achievement of boys or girls is higher in mathematics from grade 7 through grade 12 and in reading in grades 7 and 8. Accordingly, much caution is required before making any prediction or assumption as to whether the mean achievement of the boys or girls of a given school will be higher. And even more important, a reliable prediction cannot be made about any individual student's level of educational achievement in any subject field, based only on knowing whether the student is male or female.

Finally, the consistently lower mean achievement of the boys in the English/language areas, including reading in high school, suggests that this may be of great concern for the occupational and career plans of the boys. Undoubtedly, high achievement in the English/language arts is as necessary for boys to achieve occupational success as is high achievement in mathematics for girls.

Differences in Achievement Among Quarters in Mental Ability

Historically, students of lower mental ability are thought not to gain as much in the academic subjects during their secondary school years as students of higher mental ability. However, a considerable amount of federal and state legislation during the 1960s and 1970s was directed toward encouraging higher achievement by the lowest achieving students. In the present research the improvement strategies were directed toward getting each student to achieve up to the student's mental ability level. Particular attention was given to raising the achievement of the quarters achieving below mental ability and also to individual students whose achievement percentile rank was farthest below the mental ability percentile rank. Table 8.5 summarizes the significant gain by quarter interactions for each longitudinal cohort of each school.

At Steuben Middle School there were three longitudinal cohorts. A total of 72 pairwise comparisons of the four quarters of the three cohorts might have been statistically significant, a total of 24 for each of the cohorts, 6 for each of the 4 areas tested. Of these 72, only four were significantly different. The first and lowest quarter of each Cohorts 1 and 2 gained significantly less than two higher quarters in reading total. There were no significant gain by quarter interactions in language, spelling, or math total.

There were 48 possible significant pairwise comparisons at Sandburg Junior High School involving the four quarters of each of the two cohorts in four areas of testing. Here there were only two significant pairwise comparisons. Quarter 1 of Cohort 2 gained more in spelling from grade 7 to grade 8 than did Quarters 3 and 4.

At both Steuben and Sandburg, the students of each cohort could show a gain only from the grade 7 to the grade 8 testing. At Webster Transitional School the locally constructed tests--parts of speech, sentences, language total, and mathematics--were administered a total of four times in grades 6, 7, and 8. Accordingly, a total of 288 pairwise comparisons might have been significant. Reading vocabulary and reading comprehension were measured once per year for three years. Accordingly, 72 pairwise comparisons might have been significant re-

Table 8.5. Summary of Significant Gain by Quarter Interactions (ANOVA) for Each Longitudinal Cohort of Five Schools

STEUBEN	Cohort 1 G7→G8	Cohort 2 G7→G8	Cohort 3 G7→G8				Total Number of Possible Pairwise Comparisons Across Cohorts
Reading Total	Q2,Q3>Q1	Q3,Q4>Q1	NS				18
Language	NS	NS	NS				18
Spelling	NS	NS	NS				18
Math	NS	NS	NS				18
SANDBURG	Cohort 1 G7→G8	Cohort 2 G7→G8					
Reading Total	NS	NS					12
Language	NS	NS					12
Spelling	NS	Q1>Q3,Q4					12
Math Total	NS	NS					12
WEBSTER	Cohort 1	Cohort 2					
Parts of Speech	NS	NS					72
Sentences	G6F→G7S:Q3>Q1[1] G6F→G8S:Q3,Q4>Q1	G6F→G7F:Q4>Q1 G6F→G7S:Q3,Q4>Q1 G6F→G8S:Q4>Q1					72
Language Total	NS	NS					72
Mathematics	G6F→G7F:Q3,Q4>Q1 G6F→G7F:Q4>Q2 G6F→G8F:Q4>Q1 G7F→G8S:Q1,Q2>Q4	G6F→G7F:Q3,Q4>Q1 G7F→G8S:Q1>Q3,Q4					72
Vocabulary	NS	NS					36
Comprehension	G6S→G8S:Q4>Q3	NS					36
CEDARBURG[2]							
HOOD RIVER VALLEY	G10→G11 Cohort 1	G10→G11 Cohort 2	G11→G12 Cohort 1	G11→G12 Cohort 2	G10→G12 Cohort 1	G10→G12 Cohort 2	
Reading	Q1>Q2	NS	NS	NS	Q1>Q2	NS	36
English	NS	NS	NS	NS	NS	NS	36
Math	NS	NS	NS	NS	NS	NS	36

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[1] G = Grade, F = Fall Testing, S = Spring Testing.

[2] There were no significant Gain by Quarter Interactions for the two PACE longitudinal cohorts.

lated to these two subjects. A total of 18 significant pairwise differences were obtained. Seven significant differences were found for sentences and in all cases Quarter 3 or Quarter 4 gained significantly more than Quarter 1 (lowest quarter). Ten significant differences were related to mathematics; in six instances, Quarter 3 or 4 gained more than Quarter 1 while in the other four Quarter 1 gained more than a higher quarter including Quarter 4. The last significant pairwise comparison showed that Quarter 4 of Cohort 1 gained more in reading comprehension than did Quarter 3.

There were no significant differences between the gains of any two quarters of either PACE cohort in any of the 10 areas tested at Cedarburg High School. Of the 108 possible significant differences at Hood River Valley High School only two were significant. Quarter 1 of Cohort 1 gained more than Quarter 2 from grade 10 to grade 11 and also from grade 10 to grade 12 in reading.

In view of the very small number of gain x quarter interactions and the related small number of significant pairwise comparisons, we conclude that the quarters in mental ability with very few exceptions gained equally from one grade to the next in the two middle schools, the junior high school, and the two senior high schools. The first author of this monograph had not expected to find this pattern of gains. It was anticipated that Quarter 4, the highest quarter, might not gain more than any other quarter because of the fact that a number of students in each school in the top quarter in mental ability scored near the top of the test. However, it was expected that Quarters 2 and 3 would quite consistently gain more from one grade to the next than did Quarter 1, the lowest quarter. Apparently, the considerable effort in all five schools that was directed toward securing higher achievement by the lowest-achieving students, regardless of their mental ability level, contributed to Quarter 1 gaining as much from one grade to the next as Quarters 2 and 3.

Effects of Implementing the Improvement Strategies on the Total Grade Groups and Longitudinal Cohorts

A central purpose of this research was to determine the effects of annually implementing three improvement strategies on student achievement in English, mathematics, and reading. A summary of the conclusions regarding this purpose is presented for each school. Steuben Middle School, Carl Sandburg Junior High School, and Hood River Valley High School are presented first since there were baseline grades in 1977-78 for all the grades of these schools and the achievement testing was done in the spring of the year. In these three schools, only minor planned improvements could be made in the second semester of 1979-80 since the first spring achievement test data of 1977-78 were not summarized and interpreted until the fall semester of the 1978-79 school year. At Webster Transitional School and Cedarburg High School most of the testing was done in the fall, including in

1977-78, and there were not baseline grades for each grade of these schools in 1977-78.

The main information regarding student outcomes that was used in determining the effects of implementing the improvement strategies each year is drawn from the comparisons of the achievements of the classes of a given grade level; e.g., the four grade 7 classes of Steuben Middle School. The comparisons of the mean achievements of the students of the later longitudinal cohorts with the achievements of the earlier cohorts is regarded as providing supporting information. A significantly higher mean achievement by a later grade or cohort is interpreted as a positive result. A significantly lower mean is regarded as negative and a nonsignificant difference is regarded as neutral, provided that there were no offsetting negative effects of unanticipated events. For Cedarburg High School a nonstatistical comparison was made of the mean achievement of two PACE and two traditional longitudinal cohorts.

Steuben Middle School

Individual instructional programming was being implemented in the academic subjects in 1977-78, and it was refined each year thereafter. Individual educational programming was being implemented indirectly in 1977-78 inasmuch as the same academic subjects were required of all the students and in these subjects individual instructional programming was being implemented. Starting in 1978-79 and continuing thereafter the individual programs of only part of the students were monitored and evaluated each semester. Goal setting and carrying out related improvement activities were started by about one-third of the I & A Unit teams in the second semester of 1978-79 and by all the I & A Unit teams in 1979-80 and 1980-81. Accordingly, individual instructional programming and goal setting were implemented concurrently for the first time in 1979-80, while individual educational programming was implemented to a lesser extent.

What were the effects of implementing the improvement strategies on student achievement? Table 8.6 gives the adjusted means of the students of each grade 7 and grade 8 class that had mental ability scores, the equivalent percentile ranks, and the results of the comparisons of the means of each pair of classes.

The mean of the 1978-79 grade 7 classes was significantly lower than that of the 1977-78 class in reading total, significantly higher in language, and not significantly different in spelling or math total. On the other hand, the means of the last two classes were significantly higher than the means of one or both of the first two classes in all four areas--reading total, language, spelling, and math total. The mean of the 1978-79 grade 8 class was significantly higher than that of the 1977-78 class in spelling and not significantly different in the other three areas. However, the means of the last two classes were significantly higher than the means of one or both of the first two classes in all four areas--reading total, language, spelling, and math total.

Table 8.6. Adjusted Means (ANCOVA) and Equivalent National Percentile Ranks for Successive Grade 7 and Grade 8 Classes: Steuben Middle School

	Comparisons of Successive Groups					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Grade 7						
Reading Total	S-	NS	NS	S+	S+	NS
Language	S+	S+	S+	NS	S+	S+
Spelling	NS	NS	S+	NS	NS	NS
Math Total	NS	S+	S+	NS	S+	NS
Grade 8						
Reading Total	NS	NS	S+	NS	NS	S+
Language	NS	NS	S+	NS	S+	NS
Spelling	S+	S+	S+	NS	NS	NS
Math Total	NS	S+	S+	NS	S+	NS

	Adjusted Means and Equivalent Percentile Ranks							
	1977-78		1978-79		1979-80		1980-81	
	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 7								
Reading Total	43.44	34	39.92	29	42.66	34	43.11	34
Language	38.21	30	41.17	32	42.09	36	45.27	42
Spelling	26.17	40	27.31	44	26.74	44	27.69	48
Math Total	50.75	30	54.95	36	60.14	44	60.06	44
Average Student N		223		323		289		304
Grade 8								
Reading Total	48.98	30	50.03	32	48.28	28	52.46	35
Language	44.66	30	45.37	30	46.77	32	48.08	34
Spelling	27.64	32	29.25	36	29.74	38	30.57	39
Math Total	60.45	32	62.53	34	65.43	36	68.38	42
Average Student N		228		237		267		224

S+ The mean of the group of the later year was significantly higher than the mean of the group of the earlier year.

S- The mean of the group of the later year was significantly lower than the mean of the group of the earlier year.

The results for the three longitudinal cohorts support these for the successive grades. In all areas except reading total, the mean achievements of the second and third cohorts were significantly higher than those of a prior one. Similar favorable results were obtained on a locally constructed mathematics test.

These consistently positive results of the last two years are attributable to the goal setting and carrying out related improvement activities and to providing better instructional programs for the individual students, including by the use of CAI for some students in reading and math that started in second semester of 1978-79.

The attitudes of the students toward school and their self-concepts remained stable until 1980-81 when they became slightly more positive. A planned improvement in 1980-81 involving a human relations inservice program probably contributed to the more positive attitudes and self-concepts in 1980-81. The attendance of the students was about the same from year to year but slightly higher in 1980-81. A program for contacting parents of absent students and taking other positive actions probably contributed to this increase in attendance in 1980-81.

Based on these findings regarding educational achievement, attitudes, and attendance, we conclude that implementing the improvement strategies was effective in producing desired student outcomes. The large majority of positive findings were accounted for with reasonable certainty in terms of the planned improvements that were carried out when implementing the improvement strategies. Regarding the effects of unanticipated events, the loss of six aides in 1980-81 probably affected student achievement negatively, but this cannot be assured inasmuch as student achievement was higher in 1980-81 than in any other year.

Carl Sandburg Junior High School

The teachers implemented individual educational programming indirectly starting in 1977-78, but did not plan and monitor the individual educational programs of their students. They were already arranging individual instructional programs for each student in the academic subjects, all of which were required of all the students. Individual instructional programming was refined each year thereafter. Goal setting and carrying out related improvement activities were started for the first time in 1979-80. Thus, both goal setting and individual instructional programming were implemented concurrently for the first time in 1979-80, and individual educational programming was implemented indirectly. The changes in student achievement from year to year are given in Table 8.7.

The mean achievement of the 1978-79 grade 7 class was not significantly different from that of the 1977-78 class in any of the four areas tested. However, the grade 7 class of 1979-80 achieved significantly higher in language than the two earlier classes combined, higher than both earlier classes in spelling and math total, and not significantly different from either prior class in reading total. The differ-

Table 8.7. Adjusted Means and National Percentile Ranks for Successive Grade 7 and Grade 8 Classes: Carl Sandburg Junior High School

	Comparison of Successive Classes			Adjusted Means and Equivalent Percentile Ranks					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1979-80 vs 1978-79	1977-78		1978-79		1979-80	
				$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 7									
Reading Total	NC	NC	NC	92.96	62	92.36	61	93.36	64
Language	NS	NS	NS*	94.76	56	94.62	56	97.09	62
Spelling	NS	S+	S+	95.11	61	95.20	61	98.54	69
Math Total	NS	S+	S+	98.22	49	99.32	53	101.72	61
Average Student N				173		149		157	
Grade 8									
Reading Total	NC	NC	NC	97.96	60	97.37	59	97.75	60
Language	NC	NC	NC	100.80	60	99.17	56	99.51	57
Spelling	NC	NC	NC	99.86	54	98.11	50	99.14	52
Math Total	NS	S+	S+	101.68	45	100.12	39	103.99	50
Average Student N				188		164		159	

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.
NC Post-hoc not computed since the difference among the successive classes was not significant at the .05 level.
* The adjusted mean was higher for 1979-80 than for both prior years combined.

ence among the three grade 8 classes was not significant in reading total, language, or spelling. However, the grade 8 class of 1979-80 achieved significantly higher than the two prior grade 8 classes in math total.

The results for the two longitudinal cohorts support the preceding results. The students of the second cohort achieved significantly higher than the first one in math total and not significantly different in reading total, language, and spelling.

The preceding positive results for 1979-80 are attributed to more effective implementation of individual instructional programming and implementation of the goal-setting strategy for the first time in 1979-80. Implementation of the goal setting in 1979-80 was accompanied with increasing the amount of time given to spelling and language and adding a math problem-solving course for the grade 7 students and special math activities for the high achieving grade 8 math students. Thus, the positive findings are accounted for with reasonable certainty. Having only new grade 8 language arts teachers in 1979-80 very likely was the cause of the lack of significantly higher grade 8 achievement in language, reading, and spelling in 1979-80 and also the lack of significantly higher achievement in these areas by the second longitudinal cohort.

The grade 7 students' attitudes toward the school and toward the teachers became more positive from the first to the third year while their attitudes toward learning, their peers, and self remained constant. The grade 8 students' attitudes toward the school became more positive from the first to the third year while their attitudes toward their teachers, learning, their peers, and self remained relatively constant. Two planned improvements are probably responsible for the more favorable attitudes toward school by the students of both grades 7 and 8 and by the students of grade 7 toward teachers: a staff development program of 1978-79 that was designed to develop a better understanding of middle school adolescents, the formation of a Sandburg Parent Association, and the use of other techniques to promote more effective communication with parents. The nonspecific planned events of 1978-79 that may have contributed to the more favorable attitudes toward school were starting an intramural athletic program in 1978-79 and an elective program in the allied arts. The fact that attitudes toward learning, self, and peers either remained constant or fluctuated somewhat from year to year appears to be unrelated to the planned improvements or the unanticipated events. A loss of teachers in 1979-80 due to lower enrollment and the accompanying reorganization of the four I & A Units into three units and a study to determine whether to close an elementary school or Sandburg Junior High School were all regarded as having a negative effect on student attitudes but this relationship cannot be assured.

The attendance of the students was about the same from year to year. The small difference in attendance is attributable mainly to differences in winter weather conditions and the time of annual holidays and vacation periods.

Hood River Valley High School

In 1977-78 each teacher, administrator, and counselor served as an educational advisor, or guide, to approximately 15 students. During the first two years of the project these guides consulted with their advisees weekly or more often regarding which units of courses to enroll in, but they did not evaluate the effectiveness of the programs at the end of the semester or year. This advising was accompanied with some students not completing courses in any subject as they might have during a semester and also not taking advanced courses in English or mathematics as they might have. In 1979-80 the advising was changed so that English and mathematics teachers were involved in advising all students regarding English and mathematics courses.

Throughout the project the teachers arranged individual instructional programs for each student enrolled in their courses. However, the amount of individual assignments decreased and the amount of class-size group instruction increased during the first two years as instructional programming was refined. Goal setting and carrying out related improvement activities were started in 1979-80 and continued in 1980-81. Thus, a considerable number of refinements were made in the first two strategies during the first two years of the project, and all three were implemented in the last two years.

As shown in Table 8.8, the mean achievement of the 1978-79 grade 10 class was not significantly different from the mean of the 1977-78 class in any of the three areas--English, math, or reading. However, the last two grade 10 classes achieved significantly higher than one or both of the first two classes in all three areas. These significantly higher achievements of the last two grade 10 classes are judged to have resulted from the refinement of individual educational programming in 1979-80 and from the goal setting and related improvement activities starting in 1979-80. The improvement activities included (a) an inservice program to improve reading achievement starting in 1978-79, (b) a required English 10 course starting in 1979-80, (c) a grade 10 mathematics placement program starting in 1978-79, (d) advising all students regarding math and English courses by math and English teachers starting in 1980-81, (e) requiring students to complete three units of a course rather than only one starting in 1980-81, and (f) increasing the requirements in the academic subjects for high school graduation and decreasing the electives and the "survival skills" requirements.

The mean reading, English, and mathematics achievement of the first three grade 11 classes was not significantly different. On the other hand, the 1980-81 grade 11 class achieved significantly higher than the grade 11 classes of the three prior years, except that the mean achievement in English in 1980-81 was not significantly higher than in 1978-79. The higher achievements are accounted for by the prior planned changes made for grade 10 that were also made for grade 11. The fact that the grade 10 group achieved significantly higher in 1979-80 than in 1977-78 in all three subjects while the grade 11 group did not until 1980-81 is accounted for in terms of the cumulative effects of the planned changes. For example, the grade 11

Table 8.8. Adjusted Means and Percentile Ranks for Grade 10, Grade 11, and Grade 12 Classes: Hood River Valley High School

	Comparisons of Successive Groups					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Grade 10						
Reading	NS	S+	S+	S+	NS	NS
English	NS	S+	S+	S+	NS	NS
Math	NS	S+	S+	S+	NS	NS
Grade 11						
Reading	NS	NS	S+	NS	S+	S+
English	NS	NS	S+	NS	NS	S+
Math	NS	NS	S+	NS	S+	S+
Grade 12						
Reading	NS	NS	NS	NS	NS	NS
English	NS	NS	NS	NS	NS	NS
Math	NS	NS	NS	NS	NS	NS

	Adjusted Means and Equivalent Percentile Ranks							
	1977-78		1978-79		1979-80		1980-81	
	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 10								
Reading	47.85	74	46.20	70	53.66	81	52.85	80
English	43.04	46	41.56	43	47.74	56	49.14	60
Math	25.99	54	24.50	49	29.43	64	28.91	62
Average Student N		195		160		173		132
Grade 11								
Reading	54.10	54	55.42	59	52.81	52	58.55	65
English	47.32	45	48.64	48	46.67	43	51.40	55
Math	29.49	56	30.18	58	30.00	58	32.88	66
Average Student N		151		169		113		156
Grade 12								
Reading	56.34	53	59.03	58	58.81	58	56.73	54
English	49.05	42	51.34	47	51.85	48	50.58	45
Math	30.64	53	32.39	59	32.00	58	31.66	56
Average Student N		116		137		145		110

S+ The mean achievement of the group of the later year was significantly higher than the mean of the group of the earlier year.

class of 1979-80 did not take the required English class when in grade 10 but the 1980-81 grade 11 class did.

The means of the later grade 12 classes were not significantly different from the means of the prior grade 12 classes. This lack of significantly higher grade 12 achievement cannot be accounted for in terms of the planned changes that were made in the last two years in implementing the improvement strategies. However, the grade 12 class of 1980-81 did not experience the planned changes in the curriculum, advising, and instruction when in grades 10 and 11 that the grade 10 and grade 11 classes of 1980-81 did.

The results pertaining to the two longitudinal cohorts are not readily related to the preceding results inasmuch as the mean achievement of Cohort 2 was significantly lower than the mean of Cohort 1 in reading but not significantly different in English and math.

The attitudes of the students toward school became slightly more positive from the first year of testing in 1978-79 to 1980-81. Planned improvements were carried out in 1979-80 and 1980-81 to get more favorable attitudes. The lack of greater gains is probably attributable to making greater demands on the students to achieve in the courses in which they were enrolled and decreasing the student's choice of courses and units of courses.

Attendance was about the same for the first two years, but it decreased and the dropout rate increased in 1979-80. Attendance increased and the dropout rate decreased in 1980-81. The lower attendance occurred in part when the potential dropouts did not attend school regularly before withdrawing voluntarily or being dropped officially by the school. After some of the students dropped out in 1979-80, attendance went up in 1980-81 and the dropout rate decreased. The lower attendance and the higher dropout rate in 1979-80 are attributable to placing higher demands on the students to achieve, to the deepening recession in the forestry industry, or both.

The conclusion is drawn with high confidence that implementation of the three improvement substrategies in the last two years yielded higher student achievement in grades 10 and 11. The students of the last two grade 12 classes did not experience the several highly important changes made when they were enrolled in grades 10 and 11. Unanticipated events included a teacher strike, many changes in the teaching staff in 1978-79, and the recession in the forestry and lumbering industry that became especially acute starting in 1979-80. These events very likely contributed to the lack of even more favorable student outcomes.

Webster Transitional School

The teachers of Webster were already arranging individual instructional programs for their students in the academic subjects in the fall of 1977-78, and they refined their practices each year thereafter. In 1978-79 they started planning and monitoring the individual educational programs of their student advisees. Goal setting and carrying out related improvement activities were started by all of the I & A Unit teams in 1979-80. Accordingly, the three improvement strategies were being implemented in all grades in 1979-80 and 1980-81.

It will be recalled that the test scores of individual students were available for final analysis for grade 6 starting in 1977-78, grade 7 in 1978-79, and grade 8 in 1979-80. The results for the successive grade 6, grade 7, and grade 8 classes are given in Table 8.9.

The fall test results for grade 6 reflect the students' achievement during the elementary school years and are not discussed further. The spring test results of grade 6 reflect the educational program at Webster. The means of the grade 6 classes of 1978-79 and 1979-80 in reading comprehension in the spring were significantly higher than the mean of the grade 6 class of 1977-78 and not significantly different in reading vocabulary. The grade 7 class of 1979-80 achieved significantly higher than the first class of 1977-78 in mathematics, vocabulary, and comprehension and not significantly different in the other three areas--parts of speech, sentences, and language total. The 1980-81 class achieved significantly higher than one or both of the two earlier classes in all five areas except reading vocabulary where it achieved significantly lower than the two earlier classes. The means of the grade 8 class of 1980-81 for parts of speech, language total, mathematics, and reading comprehension were significantly higher than the means of the class of 1979-80, not significantly different for sentences, and significantly lower for reading vocabulary.

The findings for the two longitudinal cohorts support those just enumerated for the successive grade 6, grade 7, and grade 8 classes. The mean achievement of Cohort 2 was significantly higher than that of Cohort 1 in mathematics and reading comprehension, significantly lower in reading vocabulary, and not significantly different in the other areas.

The consistently higher achievements in 1979-80 and 1980-81 are attributable primarily to the refined individual instructional programming and to the goal setting that was started in 1979-80 and continued in 1980-81. Moreover, child-parent conferences were started on a systematic basis in 1979-80 and continued into 1980-81. These conferences included discussion of the child's educational program and also the child's progress or lack of it.

The negative finding regarding reading vocabulary is related to a fundamental deficiency in the school district's language arts curriculum that extends from the primary school into the high school. Insufficient attention is given to reading vocabulary at all of the school levels and the middle school staff could not make the changes in the curriculum that were necessary to overcome the deficiency.

The attitudes of the students toward various aspects of their schooling remained relatively stable except that there was a small drop in 1980-81. The less favorable attitudes in 1980-81 may possibly

Table 8.9. Adjusted Means of the First and Last Grade 6, Grade 7, and Grade 8 Classes: Webster Transitional School

	Comparison of Successive Classes						Adjusted Means and Equivalent Percentile Ranks											
	1978-79 vs 1977-78		1979-80 vs 1977-78		1979-80 vs 1978-79		1977-78				1978-79				1979-80			
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile
Grade 6																		
Parts of Speech	NS	NA	NS	NA	NS	NA	80.73				82.86				87.21			
Sentences	NS	NA	NS	NA	NS	NA	9.15				7.48				7.45			
Language Total	NS	NA	NS	NA	NS	NA	90.61				90.57				94.92			
Mathematics	NS	NA	S+	NA	S+	NA	44.85				44.80				59.56			
Vocabulary	NI	NS	NA	NS	NA	NS			54.27	67			54.67	68			55.29	70
Comprehension	NI	S+	NA	S+	NA	NS			52.79	60			54.53	67			54.42	67
Average Student N	180																	

	Comparison of Successive Classes						Adjusted Means and Equivalent Percentile Ranks											
	1979-80 vs 1978-79		1980-81 vs 1978-79		1980-81 vs 1979-80		1978-79				1979-80				1980-81			
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile
Grade 7																		
Parts of Speech	NS	NS	S+	S+	S+	S+	119.27		158.07		120.20		162.68		137.28		169.58	
Sentences	NS	NS	S+	S+	S+	S+	20.46		43.32		22.38		45.74		31.23		50.21	
Language Total	NS	NS	S+	S+	S+	S+	139.75		201.10		142.77		208.42		168.64		219.85	
Mathematics	S+	NA	S+	NA	NS	NA	100.89				116.19				125.95			
Vocabulary	NA	S+	NA	S-	NA	S-			54.25	67			55.61	71			52.53	60
Comprehension	NA	S+	NA	S+	NA	S+			55.21	70			56.76	75			59.13	82
Average Student N	196																	

	Comparison of Successive Classes		Adjusted Means and Equivalent Percentile Ranks							
	1980-81 vs 1979-80		1979-80				1980-81			
	Fall	Spring	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile
Grade 8										
Parts of Speech	NA	S+			168.05				172.03	
Sentences	NA	NS			51.84				54.55	
Language Total	NA	S+			219.45				226.69	
Mathematics	S+	S+	159.03		206.97		168.66		214.97	
Vocabulary	NA	S-			55.32	71			53.86	65
Comprehension	NA	S+			54.87	69			58.33	80
Average Student N	207									

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.
NA Not administered.
NI Not included in the analysis.

have been related to the increased demand placed on some students to achieve higher.

The attendance of the students was about the same from year to year but slightly lower in 1980-81, apparently due to winter weather conditions, the timing of holidays, and parents taking their child out of school to coincide with the parents' vacation times.

There was a considerable reorganization of the teachers and students into I & A Units in 1979-80 due to a continued decline in student enrollment. Six teachers were new to the school in 1980-81. These unplanned events may have been a deterrent to even higher achievement by the grade 6, 7, and 8 classes of 1979-80 and 1980-81.

Cedarburg High School

At Cedarburg High School there were two alternative programs of education starting with the entering grade 9 class of 1977-78. One was a continuous progress program, called PACE, and the other was the traditional high school program that was continued. Each year following 1977-78, another grade 9 PACE group started, and the initial PACE group moved upward one grade. Accordingly, there were four successive grade 9 PACE groups that were tested starting in the fall of 1977-78, three grade 10 groups starting in the fall of 1978-79, two grade 11 groups starting in the fall of 1979-80, and one grade 12 in 1980-81.

The students enrolled in the two programs on a volunteer basis. Those who enrolled in the PACE program consistently had higher mean mental ability and higher mean achievements when they entered grade 9. Because of these and other possible differences, such as in motivation, the mean achievements of the PACE and traditional students were not compared statistically.

Individual educational programming was carried out reasonably well during the first two years of the project, 1977-78 and 1978-79. Individual instructional programming was carried out for the first two sets of PACE students reasonably well when they were in grades 9 and 10, except for a curriculum constraint, but for only part of the PACE students when in grade 11. The curriculum constraint was that the PACE students had to use the same textbooks and study the same content as the traditional students in all courses, even though the PACE students entered grade 9 with considerably higher mean achievement and mental ability than the traditional students. Goal setting was not carried out systematically until 1980-81; however, this was too late to be reflected in the results of the fall testing of 1980-81.

The assistant principal, who was the coordinator of the PACE program, resigned at the end of the 1978-79 school year, and the PACE program was not extended into grade 11 in 1979-80 nor into grade 12 in 1980-81 as it had been initially planned in 1976-77. This unanticipated event, along with the curriculum constraint placed on the grade 9 and grade 10 program, resulted in no significantly higher achievements for the second and third grade 10 PACE groups of 1979-80 and

1980-81 than for the first grade 10 group of 1978-79. The second grade 11 group in 1980-81 achieved significantly higher than the first one of 1979-80 only in language total.

Despite the curriculum constraint and other negative conditions associated with the resignation of the PACE coordinator, the first two longitudinal groups of PACE students got off to a good start in 1977-78 and 1978-79, receiving both personalized advising and individual instructional programming from the teachers of the academic I & A Unit teams. The advising of the PACE students continued into grades 11 and 12.

A comparison of the differences between the adjusted means of the PACE and traditional students of longitudinal Cohorts 1 and 2 provides information regarding the effects of implementing individual instructional programming and individual educational programming when the PACE students of the two longitudinal cohorts were in grades 9 and 10 and of the advising process in grades 9, 10, and 11. It will be recalled that the fall testing of the grade 12 students in 1980-81 reflects the grade 11 program.

Table 8.10 presents the adjusted means in language, math, and reading and the differences between the PACE and traditional cohorts. The means were adjusted for differences in mental ability between the two longitudinal PACE cohorts and between the two longitudinal traditional cohorts, not between the PACE and the traditional cohorts. The differences between the means of the PACE and traditional students were consistently greater in grade 12 than in grade 9 in reading, language, and math for Cohort 1 and in grade 11 than in grade 9 for Cohort 2. These differences were not tested for statistical significance; however, their size and consistency are regarded as sufficient to be of practical importance.

The differences consistently favored the PACE cohorts and suggest that the advising and the individual instructional programming carried out with the students of the first two PACE longitudinal cohorts had positive effects, despite the negative factors indicated earlier. The positive effects may be due in part to the higher ability of the PACE students. However, the traditional longitudinal cohorts had a greater opportunity to gain since their mean achievements when in grade 9 were consistently lower than the grade 9 PACE means.

The attitudes and attendance of the PACE students were very favorable during the first two years, but they did not continue as high during 1979-80 as the two earlier years. The dropout rate of the PACE students was very low, considerably lower than that of the traditional students.

Two final conclusions are in order. First, the implementation of individual educational programming and individual instructional programming in the PACE program during the first two years of the project and the personalized advising for the first three years had a positive effect on student achievement despite a severe curriculum constraint. The same factors influenced attitudes and attendance positively.

Table 8.10. Adjusted Means and Differences between Means for PACE and Traditional Longitudinal Cohorts 1 and 2: Cedarburg High School

	Comparison of Mean Gain by Each Cohort						
	Cohort 1				Cohort 2		
	Gr. 9 1977-78	Gr. 10 1978-79	Gr. 11 1979-80	Gr. 12 1980-81	Gr. 9 1978-79	Gr. 10 1979-80	Gr. 11 1980-81
Reading							
PACE	15.62	17.49	18.61	19.79	14.15	16.03	18.67
TRAD	13.37	15.39	15.70	16.93	14.11	15.82	17.75
Diff.	2.25	2.10	2.91	2.86	0.04	0.21	0.92
Language							
PACE	15.82	17.72	18.21	19.41	15.85	17.60	19.59
TRAD	13.19	15.18	15.54	16.01	14.95	16.48	18.45
Diff.	2.63	2.54	2.67	3.40	0.90	1.12	1.14
Math							
PACE	13.85	17.34	18.66	19.16	14.03	16.56	18.99
TRAD	12.76	14.98	15.11	16.24	12.93	14.96	16.61
Diff.	1.09	2.36	3.55	2.92	1.10	1.60	2.38
Student N							
PACE	61				87		
TRAD	122				130		

Second, the conditions following the resignation of the assistant principal, who was the coordinator of the PACE program, had a negative effect on student achievement, attitudes, and attendance, despite a strong effort by the assistant coordinator and the school district administration to extend the program upward into grades 11 and 12 and to refine the grade 9 and grade 10 program.

Facilitative School Structures and Processes

The effects of implementing the improvement strategies were indicated in the preceding chapters and were summarized in this chapter. As a means of verifying these effects, the principal or another person in each school reviewed a draft of the chapter pertaining to the particular school. About six months later the same person responded to a questionnaire that was designed to secure summary information pertaining to the school's improvement activities. The first three parts of the questionnaire dealt with specific activities that the school carried out in implementing the three improvement strategies while the last part focused on the school structures and processes that facilitated the implementation of the strategies.

The questionnaire items and the responses of each school follow and are interpreted using the following code:

1. Steuben Middle School
2. Webster Transitional School
3. Carl Sandburg Junior High School
4. Hood River Valley High School
5. Cedarburg High School

. . .

A. Started during or after 1977-78
B. Started before 1977-78 and extended or refined during or after 1978.
C. Started before 1977-78 and not changed thereafter
D. Not carried out during or after 1977-78

1. Arranging a more appropriate total educational program in the academic subjects for students achieving below expectancy in terms of mental ability through activities such as:

1B, 2B, 3B, 4B, 5B	1.1.	Encouraging the student to select a total program of academic courses and/or units/objectives of required courses in line with ability.
1B, 2B, 3A, 4B, 5B	1.2.	Encouraging the student to spend time at school and/or out of school on course-related activities.
1D, 2B, 3D, 4B, 5B	1.3.	Advising the student to take more elective courses and/or more units/objectives in the required academic subjects.
1D, 2A, 3D, 4B, 5A	1.4.	Advising the student to take advanced rather than elementary courses and/or advanced units/objectives in the required academic subjects.
1D, 2D, 3D, 4A, 5B	1.5.	Encouraging the student to spend less time on an out-of-school job and/or extracurricular activities and to take more courses and/or units/objectives in the required academic subjects.
	1.6.	Add others and check A, B, C, or D.

3B. Tailored the curriculum units to match up with low achievers' ability levels.

2. Arranging more effective instruction in the academic subjects for individual students through activities such as:

1B, 2B, 3A, 4B, 5B	2.1.	Getting students of low motivation to take more initiative to learn.
1B, 2B, 3A, 4B, 5B,	2.2.	Getting students to spend more time in active learning during the class period.

1B, 2B, 3A, 4A, 5B	2.3.	Encouraging more effort on the part of the student achieving below expectancy.
1B, 2A, 3B, 4A, 5B	2.4.	Using available instructional materials flexibly and securing additional materials, especially to provide better for different learning styles.
1A, 2A, 3B, 4A, 5B	2.5.	Matching individual assignments, small group activities, and whole class activities with individual student's motivation, learning styles, and interests.
1B, 2B, 3B, 4A, 5B	2.6.	Providing out-of-class activities, including homework.
1B, 2B, 3B, 4B, 5B	2.7.	Providing encouragement and other social reinforcements, especially to the lower-achieving students.
1B, 2B, 3B, 4B, 5B	2.8.	Modeling enthusiasm for the subject matter and the students.
	2.9.	Add others and check A, B, C, or D.

4B. Annual and ongoing evaluation of effectiveness of instructional program and recommending improvements.

3. Setting goals in the academic subjects for groups of students and implementing related improvement activities such as:

1A, 2A, 3A, 4A, 5A	3.1.	Identifying the students of the group achieving below expectancy and arranging more effective instruction for them in an existing course or curricular area.
1D, 2A, 3A, 4A, 5A	3.2.	Increasing the amount of time allocated for instruction in the course or curricular area for all students of the group.
1B, 2A, 3B, 4A, 5B	3.3.	Changing the content and objectives of the course or curricular area for all the students of the group.
1A, 2A, 3A, 4B, 5B	3.4.	Adding a required course and/or unit of an existing course.
1A, 2A, 3A, 4B, 5A	3.5.	Arranging for out-of-class instruction, e.g., computer-assisted instruction during the school day, after school study, and/or summer classes, mainly for students experiencing specific difficulties.

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[1] Goal setting was only partially implemented at Cedarburg High School, not totally with all PACE groups.

4. School conditions that facilitated carrying out the preceding improvement activities:

1A, 2B, 3D, 4B, 5A	4.1.	An educational improvement committee consisting of the administrative team and representative teachers and counselors.
1A, 2B, 3B, 4B, 5A	4.2.	The instructional staff and students organized into small groups for instruction and advising.
1A, 2B, 3B, 4A, 5B	4.3.	Time and class schedules of the teachers that permit each team of teachers to have a common meeting time from one to five days per week during the school day.
1B, 2B, 3B, 4B, 5A	4.4.	A curriculum that is structured but that can be changed to take into account the differing educational needs of students.
1A, 2A, 3B, 4A, 5A	4.5.	Use of the results of the annual testing to improve student learning and teaching.
1A, 2B, 3A, 4B, 5A	4.6.	Inservice activities conducted in a variety of ways, including during the common planning period during regular school hours.
1B, 2B, 3B, 4B, 5B	4.7.	Parental and community participation in school activities.
1B, 2A, 3B, 4B, 5A	4.8.	Student participation and input regarding the curriculum, instruction, evaluation, and other matters.
1A, 2A, 3A, 4A, 5A	4.9.	External support in starting the data-based improvement activities.

The preceding improvement activities that the schools carried out in implementing individual educational programming, individual instructional programming, and goal setting seem clear. The school conditions that facilitated the implementation of the strategies are also readily understood. Accordingly, only a few points are made to clarify the schools' responses.

Differences were observed between the high schools and the middle schools and junior high regarding how they implemented individual educational programming with respect to elective courses, advanced courses, and out-of-school jobs. These differences occurred because the middle schools and the junior high school in general did not have electives and their students did not have out-of-school jobs. Other than these differences, the five schools without exception either started their improvement activities associated with individual educational programming and individual instructional programming during or after the year the project began in 1977-78 or they started them before 1977-78 and refined or extended them after 1977-78. Most of the activities associated with goal setting were indicated by the schools as starting after 1977-78. As was indicated in the preceding part of this chapter, it was not until 1979-80 that goal setting was employed on a school-wide basis in four of the five schools and in Cedarburg High School on only a partial basis.

Some of the school structures and processes that contributed to the implementation of the improvement strategies were started in 1977-78 or later, and the others were extended or refined during or after 1977-78. In this regard, using the results of the annual testing to improve student learning and teaching, conducting inservice activities in a variety of ways including during regular school hours, and receiving external support in starting the improvement activities commenced in four or five of the schools after the project was started.

In summary, the kind of activities carried out by the schools and the timing of the activities as indicated in the checklist support the conclusions presented earlier regarding the implementation of the improvement strategies. Furthermore, the kind of changes that were made in the schools' organizational structures and processes to facilitate the implementation of the strategies were delineated and can be related to research in school effectiveness.

Comparison with School Effectiveness Research

Raising student achievement from year to year while maintaining positive student attitudes and school attendance as occurred in the present study is regarded as a major criterion of effective schooling. Purkey and Smith (1982) reviewed studies of school effectiveness and school organization and identified nine organization variables and four school culture variables that characterize effective schools. The school structures and processes presented in this chapter that were associated with higher student achievement are now related to these variables.

School-site management. A considerable amount of autonomy is needed by each building staff in determining the exact means by which they address the problem of increasing academic performance (Hunter, 1979). This flows from the emphasis on each school having its unique culture (Brookover & Lezotte, 1979; Rutter, 1979) and the analysis of what facilitates the adaptive implementation of innovation (Berman & McLaughlin, 1977; Hargrove et al., 1981).

In the present project, the PACE teachers of Cedarburg High School were constrained by a school board policy, and the teachers at Webster Transitional School by a Kindergarten-grade 10 curriculum guide in language arts. Both of these constraints affected student achievement negatively. Similar constraints were not identified in the other schools. In general, each school had much autonomy in planning and carrying out its improvement activities. Accordingly, the results of the present research support the concept of local school-site management and autonomy.

Leadership. Leadership is necessary to initiate and maintain the improvement process (Armor et al., 1976; Berman & McLaughlin, 1977; Brookover & Lezotte, 1979; California State Department of Education, 1980; Glenn, 1981; Hargrove et al., 1981; Levine & Stark, 1981; New York State Department of Education, 1974a, 1974b; Venezky & Winfield, 1979). The principal is uniquely positioned to fill this role and certainly his/her support is essential at the outset (California State Department of Education, 1980). Nevertheless, groups of teachers or other administrators can provide leadership. Purkey and Smith (1982) indicate that although there is little evidence on the subject, school effectiveness is likely to be enhanced to the extent that leadership arises from within the ranks of teachers.

Purkey and Smith (1982) do not address shared leadership directly but focus on leadership delegated to individual teachers by the principal or district administrator. In the present project, the typical improvement committee was composed of members of the administrative team, representative teachers, and a counselor. This committee assumed responsibility for leading the improvement activities of the school, except at Carl Sandburg Junior High School. In this small school, the principal worked directly with each academic team of teachers rather than with a representative teacher from each team. The improvement committees of the four schools planned the improvement activities, and the teacher members of the committee provided a communication link with the other teachers of the school. Accordingly, the school's educational improvement committee is regarded as the primary organizational structure responsible for the successful implementation of the improvement strategies.

Staff stability. After a school has experienced success initially, keeping the staff together seems to maintain and promote further success (New York State Department of Education, 1974(b); U.S. Department of Health, Education and Welfare, The Safe School Study, 1978). Frequent transfers are destructive and likely to retard, if not prevent, the growth of a coherent and on-going school personality (Purkey & Smith, 1982).

Results of the present study support the idea of staff stability. Conditions associated with the resignation of the PACE coordinator at Cedarburg High School at the end of the second year resulted in not properly extending the program upwards into grades 11 and 12 and not refining the grade 9 and grade 10 program. Student achievement, positive attitudes, and attendance dropped as a result. Replacement of the only two grade 8 language arts teachers at Carl Sandburg Junior High School contributed to the lack of a significant increase in grade 8 achievement in language arts. Both Webster Transitional School and Hood River Valley High School experienced a considerable loss of teachers in certain years due to decreased student enrollment and other factors. It is probable that these losses had negative effects on student achievement and attitudes in both schools.

Curriculum articulation and organization. Purkey and Smith (1982) indicate that a planned, purposeful diet of courses at the secondary level seems to be academically more nutritional than the smorgasbord approach of many electives and few requirements. If students are expected to learn science, math, and/or U.S. history, then they need to take those courses (Coleman et al., 1981; Walker & Schaffarzick, 1974).

In the present study, increasing the amount of time allocated for a certain subject and adding or requiring more units of courses in the subject field were associated with higher student achievement at Carl Sandburg Junior High School and Hood River Valley High School. In these two schools as in the other three, the extent to which the curriculum did not permit an effective educational program to be arranged for each student each year was not studied directly. However, as noted before, the curriculum constraints at Cedarburg High School and Webster Transitional School produced negative results while the curriculum changes at Hood River Valley and Carl Sandburg Junior High School produced positive effects.

Staff development. Making schooling more effective involves altering people's attitudes and behaviors as well as providing them with new skills and techniques (Purkey & Smith, 1982). In order to influence an entire school, staff development should be schoolwide rather than specific to individual teachers and should be closely related to the instructional program of the school (Armor et al., 1976; California State Department of Education, 1980; Glenn, 1981; Levine & Stark, 1981; Venezky & Winfield, 1979). This effort is incremental and requires long-term support and reinforcement (Armor et al., 1976). It seems likely that staff development presented as a form of remediation for teachers deficient in certain skills or attributes (a common implication in current practice) will encounter resistance. More appropriately staff development should flow from the expressed needs of teachers revealed as part of the process of collaborative planning and collegial relationships.

In the present project most of the staff development activities occurred during the common planning period and the individual preparation period of the teachers of the academic teams of four schools and of the broad-fields teacher groups of Hood River Valley High School. In most of the schools these activities were focused directly on the school's improvement program. In all the schools, some time outside the school day and school year was also given to planning or developing items related to the school's improvement program. Arranging for most of the staff development activities to occur during the school day for all teachers without additional pay and arranging other activities outside the school day for part of the staff for additional pay were regarded as essential to the success of each school's improvement program.

Parental involvement and support. Informing parents of school goals and student responsibilities, especially with regard to homework, appears to facilitate effective schooling (Purkey & Smith, 1982). A few studies find parental involvement and support to be a major factor in student achievement (Armor et al., 1976; Coleman et al., 1981; Levine & Stark, 1981; New York State Department of Education, 1974b).

In the present study, data were not gathered systematically regarding the kind and amount of parent involvement in any school. However, the formation of a parent group at Carl Sandburg Junior High School and the participation of parents in conferences with their child and the advisor at Cedarburg High School and Webster Transitional School were judged to have positive effects on student achievement.

Schoolwide recognition of academic success. The culture of a school is partially reflected in its ceremonies and symbols and in the accomplishments it chooses to recognize officially (Purkey & Smith, 1982). Schools that make a point of publicly honoring academic achievement and stressing its importance through the appropriate use of symbols and ceremonies encourage students to adopt similar norms and values (Brookover et al., 1979; Brookover & Lezotte, 1979; Wynne, 1980).

No data were collected in the present study regarding this variable. On the other hand, the improvement strategy involved identifying individual students and groups of students who were achieving below their mental ability and then setting goals and carrying out improvement activities to raise their achievement. Implementation of this strategy, which implies both teacher and student acceptance of the value of achievement, was regarded as the primary contributor to the many positive results.

Maximized learning time. Schools that emphasize academics, devote a greater portion of the school day to academic subjects (Coleman et al., 1981), and engage students in active learning activities a greater portion of the class period (Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw, 1980) secure higher student achievement (Purkey & Smith, 1982).

Data were not gathered in this study to relate time on task to achievement. However, in all five schools attention was given to increasing the amount of time that students actively engaged in learning activities. At Carl Sandburg Junior High School and at Hood River Valley High School, the amount of time that students spent on individualized assignments was reduced, and the amount of time given to small-group and class-size group instruction was increased. This shift was judged to increase student time on task and also student achievement.

District support. The success of the preceding organizational characteristics of effective schooling requires support from the district office (California Statement Department of Education, 1980; Hersh et al., 1981; U.S. Department of Health, Education and Welfare, The Safe School Study, 1978). While specialized help in some areas such as reading or mainstreaming seems helpful (Hargrove et al., 1981), the role of the district office is probably best conceived as guiding and helping. Hostile, perhaps even indifferent, attitudes by the district office toward school improvement programs reduce the likelihood of their being successful (Purkey & Smith, 1982).

In the present project, data were not gathered systematically regarding district support, structures, or processes. However, each district administrator was aware of the school's improvement program and supported it. In all cases some funding was provided from the district for the additional testing and for staff development activities.

Purkey and Smith (1982) regard the preceding organization-structure factors as of consequence in their own right with respect to effective schooling and also to set the stage for the process variables. The process variables that define the general concept of school culture and climate have been described by Brookover et al. (1979), Brookover and Lazotte (1979), and Rutter (1979). Four characteristics of schools that sustain a productive school climate have been described by Purkey and Smith (1982).

Collaborative planning and collegial relationships. This factor has been identified repeatedly in many different settings (Armor et al., 1976; Berman & McLaughlin, 1977; Deal et al., 1977; Glenn, 1981; Hargrove et al., 1981; Little, 1981; New York State Department of Education, 1974b; Trisman et al., 1975, 1976). Collegiality serves many purposes. Chief among them are that it breaks down barriers between departments and among teachers and administrators. It encourages the intellectual sharing that can lead to consensus, and it promotes feelings of unity and commonality among the staff.

Sense of community. Community feeling, the sense of being a recognizable member of a supportive and clearly perceived (by the staff and others) community, contributes to reduced alienation and increased achievement (Newmann, 1981; Wynne, 1980). Schools can create or build community by the appropriate use of ceremony, symbols, rules (i.e., dress code), and the like.

Clear goals and high expectations commonly shared. These characteristics have been documented in many school settings (Armor et al., 1975; Brookover et al., 1979; Brookover & Lezotte, 1979; Brookover & Schneider, 1975; California State Department of Education, 1980; Glenn, 1981; New York State Department of Education, 1974b, 1976; Rutter et al., 1979; Trisman et al., 1975, 1976; Venezky & Winfield, 1979). A clearly defined purpose is necessary for any endeavor hoping of success. Continual monitoring of the progress of individual students and of groups of students is a logical means of determining if the school's goals are being realized and can serve to stimulate and direct staff energy and attention (Levine & Start, 1981; see also Edmonds, 1981b). Newmann (1981) suggests that having clearly defined and limited goals reduces student alienation, an all too common barrier to increased effectiveness in any area of schooling.

Academically successful schools are also characterized by the expectations of the staff and students. These expectations in effective schools are that work effort and achievement will be high.

Order and discipline. Order and discipline rather than disorder and misconduct characterize effective schools (Armor et al., 1976; Brookover et al., 1979; Coleman et al., 1981; Edmonds, 1979, 1981a;

Glenn, 1981; New York State Department of Education, 1974a, 1974b, 1976; Rutter, 1981, Rutter et al., 1979; U.S. Department of Health, Education and Welfare, The Safe School Study, 1978). The seriousness and purposefulness with which the school approaches its task is communicated by the order and discipline it maintains in its building. Clear and reasonable rules, fairly and consistently enforced, not only appear to reduce behavior problems that interfere with learning but also promote feelings of pride and responsibility in the school community.

In the present research, no attempt was made to measure any of the preceding characteristics of classroom climate or the culture of the school. Rather, the improvement committees of the schools were organized in order to make collaborative planning possible and also to encourage a sense of community among the entire staff by providing a direct communication link between the teachers of the committee and all the teachers of the school. On the other hand, declining enrollments and the accompanying loss of teaching and other positions that occurred in four of the five schools appeared to have a negative effect on collaborative planning, collegial relationships, and sense of community. Implementing the improvement strategies involved the establishment of goals and correspondingly high expectations by the staff and the students. It was assumed that arranging appropriate learning activities for the individual student would make order and discipline more effective. Accordingly, we may speculate that planning and carrying out the improvement programs of the schools contributed positively to all four of the preceding characteristics of school culture and climate.

Improvement-Oriented Educational Research

The improvement-oriented research method, hereafter referred to as improvement research, that the project director formulated and employed in the present project with the assistance of the school staffs has three attributes of practical research as described by Schwab (1977) and two attributes of theoretical research (Kerlinger, 1977). The attributes of this improvement research method are now clarified by comparing and contrasting some aspects of practical and theoretical research.

First, the source of improvement research is a problem that is being experienced by practitioners. In the present project, the problem was an inability to secure as high achievement as desired in English, mathematics, and reading. The source of theoretical research is an abstract problem that is formulated by the theorist, for example, differentiating between the internal and the external attributions of the causes of success and failure.

A second attribute of improvement research is that the objective of the research is to aid practitioners in solving the problems that they are experiencing. In the present project, the immediate objective was for each school to assess the level of student achievement and to find means of raising student achievement that was regarded as low. The long-term objective was for each school to develop a permanent capability for continuously improving the educative processes of the school. This is different from theoretical research where the objective is to arrive at a few principles that describe or explain a phenomenon, such as a psychological process involved in human learning or development. For example, theoretical research on motivation is concerned with generating a few principles of motivation, while improvement-oriented research seeks knowledge about motivation that will help practitioners solve their problems of student motivation.

A third attribute of improvement research is that practitioners participate in planning and conducting the research and plan and carry out the related improvements. They collect information regarding student achievement and other behaviors. They analyze the information and use the results to modify their practices in their attempts to solve the problem. Their autonomy in these areas increases each successive year. In the present project, this attribute of improvement research was central to the success of the project. Conversely, practitioners typically are not involved in theoretical research in any way, and it is unlikely that they benefit directly from the findings.

A fourth and very critical attribute of improvement research is that relevant theory regarding the problem, research methodology, and improvement processes is identified and utilized when planning and conducting the research. This is done to avoid the extra effort and false starts that ensue when relevant knowledge is not used. With respect to this attribute, improvement research is the same as theoretical research. In the present project, the research team brought information to the schools about the problem, research method, and improvement processes. The schools assumed responsibility for determing their improvement activities with very little input from the researchers.

Finally, improvement research is designed so that its substantive and methodological aspects either will generalize to similar school situations or they will contribute to the cumulative knowledge in each of these areas. For generalizability and a contribution to cumulative knowledge to occur, the results of the research must be reported in a communicable form, such as in a book or article. Generalizability and contributing to cumulative knowledge are also considered as a primary attribute of theoretical research. Knowledge regarding the three improvement strategies and the school structures and processes that facilitated their implementation in these five schools is considered as generalizable to other schools with similar characteristics.

There are other research methods that produce knowledge that is intended to be used in the improvement of education. These methods may be compared with the preceding attributes of the improvement method.

School effectiveness research gained wide popularity with the publication of Fifteen Thousand Hours: Secondary Schools and Their Effects on Children (Rutter, Maughan, Mortimore, & Ouston, 1979). The purpose of school-effectiveness research, as noted earlier in this chapter, is to identify school and classroom structures and processes that produce desired student outcomes. School effectiveness research does not involve the practitioners in the conduct of the research nor do they necessarily change their practices as an outcome of the research. In fact, they may even be unaware of the results of the research.

Schutz (1979) described a research paradigm for verifying the quality of educational products, such as curriculum materials. This research-and-development paradigm calls for the quality of the product to be verified in an iterative cycle of developing the product, testing it in the classroom, and revising it. The cycle continues until the product is demonstrated to be effective in achieving its clearly specified objectives. Practitioners participate in the classroom testing but not in planning the research or in analysis of the data. Depending upon how they were selected and other factors, such as cost of the product and the amount of time and effort required to use it, they may or may not use the product when it becomes commercially available.

A somewhat different form of applied research calls for teachers to carry out an instructional process or method that is designed to improve education in a specified way. Through a series of experiments, the process is refined. Research of this kind is typically conducted on a specific school or classroom process such as academic learning time (Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw, 1980), concept learning (Klausmeier, 1980), mastery learning (Block, 1980), competition and cooperation (Johnson, Johnson, & Tauer, 1979), classroom management (Emmer & Evertson, 1981), and small-group processes (Slavin, 1977).

Discussion

The cross-sectional analyses performed on the students' test scores showed that the mean achievements of the later grades of 1978-79 at Steuben Middle School, Webster Transitional School, Carl Sandburg Junior High School, and Hood River Valley High School typically were not significantly different from the means of the earlier grades of 1977-78. But, as noted earlier, these schools made only minor improvements in their practices in the second semester of the second school year, 1978-79.

The means of the 1980-81 grades of these four schools in comparison with the means of the earlier three grades and the means of the 1978-80 grades in comparison with the means of the two earlier grades of 1977-78 and 1978-79 were significantly higher in 67 instances, not significantly different in 69, and significantly lower in three (all in reading vocabulary in one school). The higher achievements of these later grades are due mainly to the improvement activities that were carried out in implementing the goal-setting strategy and to a lesser extent to the refinement of the instructional programming and the educational programming strategies. The higher mean achievements of the later longitudinal cohorts in comparison with the first cohort support this conclusion. Thus, implementation of the goal-setting strategy appeared to be the determining factor in bringing about consistently higher student achievement while implementing the other strategies maintained the same level of achievement from year to year.

Cedarburg High School implemented only the individual instructional programming strategy and the individual educational programming strategy in grades 9 and 10 and to a lesser extent in grade 11. The implementation of these strategies yielded positive results in terms of maintaining or slightly improving student achievement.

The results regarding student attendance and attitudes were positive in all five schools. Attendance and attitudes became slightly more positive from year to year when goals were set to improve them, and they remained relatively stable when this was not done. Activities carried out only to raise student achievement appeared to have relatively little effect on attitudes and attendance.

The preceding positive results must be interpreted in the context of the schools having a reduction in teachers or aides in one or both of the last two years. Also, the loss of both experienced language arts teachers in 1979-80 at Carl Sandburg Junior High School probably accounts for six grade 8 language arts comparisons being non-significant rather than significant. Nine non-significant differences at Hood River Valley High School would probably have been significant had the later grade 11 students of 1979-80 and the later grade 12 students of 1979-80 and 1980-81 experienced the planned improvements that were made in grade 10 after they had already completed grade 10.

Two other points should be borne in mind regarding the changes from year to year. First, the achievements of students of age 13 and 17 in the academic subjects tended to go down during the 1970s, as shown by the National Assessment of Educational Progress (undated a, b, c, d, e). Accordingly, maintaining the same level of achievement rather than experiencing a loss from year to year might be interpreted as a positive rather than a neutral effect. Second, some of the non-significant differences occurred after the means of the students of a later grade were already significantly higher than those of an earlier grade. Maintaining this higher level of achievement also might be considered positive rather than neutral.

Based upon the consistently positive results, it is concluded that the design provides relevant guidelines for the renewal and improvement of secondary education. In this context, it is considered to be validated as both usable and effective. Even though the number of schools was small, the uniformity of the results across these schools of greatly different characteristics in different locales is noteworthy.

A few conclusions are in order regarding implementation of the design. The results of implementing the improvement strategies were more consistent across the two middle schools and the junior high school than the two high schools. Moreover, the strategies, structures, and processes of the design appeared to be more readily adapted and implemented by the middle schools and the junior high school. Although this is the case, the improvement strategies and the organization structures and processes of the design were found to be effective at the high school level in each grade in which they were implemented appropriately.

The schools set goals in terms of student achievement, and they used norm-referenced and criterion-referenced achievement tests to assess the attainment of the goals. They used the results of their mental ability tests to estimate the expected level of achievement of the students. The schools might have set goals in terms of other student outcomes in the cognitive domain, such as creativity or writing skills. Similarly, they might have employed other means of measuring student outcomes and might not have used the students' mental ability scores. The design is not prescriptive in this regard; rather, each school makes the decisions regarding desired outcomes and measurement tools.

The schools did not set goals to improve their advising, administrative, evaluation, or other school processes. However, this might have been done. The goal-setting strategy and the related planning and monitoring processes are intended to be as applicable to school structures and processes as they are to improving student achievement.

The difference between implementing this design for the renewal and improvement of secondary education and acting on the findings from school effectiveness research warrants a brief discussion. The design focuses on how a school can bring about educational improvement, including how it establishes a permanent improvement capability. We saw earlier that school effectiveness research has identified characteristics of effective schools, including clear goals, discipline, and expectations for high student achievement (Edmonds, 1982; Purkey & Smith, 1982). These descriptors of effective schools do not provide guidelines that schools can use to become effective. For example, how a school with unclear goals, a lack of order, and low student achievement is to become goal-directed, orderly, and high achieving is not made clear. The design does not directly answer these questions either. Rather, it specifies organization structures and processes by which a school identifies areas of desired improvement and then sets goals and plans and carries out improvement activities to attain the goals. Thus, a school that has developed an improvement capability is able to address any characteristic of effective schooling that it may select as well as other areas of improvement.

A Postscript

When the last data on student outcomes were collected in the schools in 1980-81, it appeared that four schools had developed a permanent improvement capability. There was some uncertainty regarding Cedarburg High School. During the next two years economic conditions worsened nationally and this was reflected in program reductions, staff reductions, or both. Accordingly, it might have been expected that the four schools would not maintain their internal improvement capability into 1982-83. This was not the case.

Steuben Middle School was continuing all of its organization arrangements in 1982-83 and was implementing the instructional programming and goal-setting strategies. Moreover, all of the prior junior high schools of Milwaukee had become middle schools and each one was developing an improvement capability similar to that of Steuben Middle School as part of a district-wide school effectiveness project.

Carl Sandburg Junior High School was continuing in much the same pattern as in 1980-81. Enrollment had stabilized at about the 1980-81 level. Individual instructional programming and goal setting were being implemented. Students of each grade were being grouped for instruction according to their entering achievement levels in language arts and mathematics. This reduced the teacher's task in providing a suitable instructional program for each student. The facilitative organization structures were continuing in the same pattern as earlier.

Webster Transitional School was continuing its improvement strategies and school organization structures and processes much as it had been in 1980-81. In the interim, a district committee had worked toward improving the district curriculum in reading vocabulary. A more clearly delineated performance-based program of education in language arts, math, and reading was being implemented. This started with grade 6 in 1980-81 and had been extended into grade 8 in 1982-83.

Hood River Valley High School was also continuing its organization arrangements and its implementation of the three improvement strategies. Both individual instructional programming and individual educational programming had been refined and parental participation had markedly increased.

In 1982-83 the PACE and traditional alternatives had been discontinued at Cedarburg High School. An educational improvement committee had been formed and was functioning effectively. All the academic teachers and students of grade 9 were organized into I & A units, and teacher advising and individual educational programming had been extended to all the students of grades 10, 11, and 12. Implementation of the goal-setting strategy had begun. Accordingly, Cedarburg High School had also developed an improvement capability.

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APPENDIX A

DESIRABILITY OF THE COMPREHENSIVE AND ENABLING OBJECTIVES:

WISCONSIN PROGRAM FOR THE RNEWAL AND IMPROVEMENT OF SECONDARY EDUCATION

Complete the identifying information by checking your position:

_____ Teacher
_____ Counselor
_____ Principal
_____ District Official
_____ Professor
_____ Other

Directions: Many recommendations have been made to improve secondary education. The recommendations of the Wisconsin Program for the Renewal and Improvement of Secondary Education (WRISE) are in the form of ten comprehensive objectives and a related set of enabling objectives for each comprehensive objective. The objectives are not prescriptive. Rather, each set of comprehensive and illustrative enabling objectives indicates possible directions for a school staff to consider when starting or refining their school's educational improvement efforts. Please rate the comprehensive and enabling objectives in terms of their indicating a desirable direction for a school's educational improvement efforts.

Please respond to every question. Use the following descriptive information in arriving at your ratings:

Desirability Scale	Interpretation
A--Highly Desirable	Implementing this objective would result in great improvement of secondary education.
B--Desirable	Implementing this objective would result in some improvement of secondary education.
C--Somewhat Desirable	Implementing this objective would result in improvement rather than deterioration of secondary education.
D--Somewhat Undesirable	Implementing this would result in deterioration of secondary education.
E--Undesirable	Implementing this would result in some deterioration of secondary education.
F--Highly Undesirable	Implementing this would result in great deterioration of secondary education.

Questionnaire constructed by Professor Herbert J. Klausmeier, Director, Wisconsin Program for the Renewal and Improvement of Secondary Education, with review by John Daresh of the Wisconsin Project and persons participating in the field test.

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Center Contract No. OB-NIE-G-78-0117

Wisconsin Center for Education Research

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. *Highly Desirable*
B. *Desirable*
C. *Somewhat Desirable*
D. *Somewhat Undesirable*
E. *Undesirable*
F. *Highly Undesirable*

COMPONENT 1: EDUCATIONAL PROGRAMMING FOR THE INDIVIDUAL STUDENT

COMPREHENSIVE OBJECTIVE 1a:

___ *1a An individual educational program of course work and other activities is arranged for each student each semester that satisfies the student's developmental needs and characteristics and that also meets district and state requirements.*

ILLUSTRATIVE ENABLING OBJECTIVES:

Each student's individual educational program which includes all courses and other activities:

___ 1.1 Is planned each semester or year by the student and the student's advisor.

___ 1.2 Takes into account the student's aptitudes for learning different subject matters, interests, motivation, learning styles, career goals, and other personal and social characteristics.

___ 1.3 Provides for experiential learning, including work experience in the community, for students who will benefit from it.

___ 1.4 Is monitored cooperatively by the student and the student's advisor throughout the semester.

___ 1.5 Is changed as necessary during the semester to assure high quality education for the student.

COMPREHENSIVE OBJECTIVE 1b:

___ *1b An individual instructional program that takes into account the student's aptitudes, interests, motivation, learning styles, career goals, and other personal and social characteristics is arranged for the student in each course and other activity that is part of the student's total educational program.*

ILLUSTRATIVE ENABLING OBJECTIVES:

The instructional program of the student:

___ 1.6 Is planned by the student and the teacher of the course at the beginning of the course.

___ 1.7 Includes course and unit objectives that are appropriate for the student in terms of the student's aptitude, entering achievement level, and career goals.

___ 1.8 Provides an appropriate amount of time in class and during or outside the school hours to suit the student's rate of achieving his or her objectives in the course.

___ 1.9 Provides for appropriate individual attention by the teacher to take into account the student's motivation and other personality characteristics.

___ 1.10 Provides for an appropriate amount of teacher-directed individual, pair, small-group, and large-group activity to take into account the student's need for structure and preferences for mode of instruction.

___ 1.11 Provides for an appropriate amount of student-initiated individual, pair, small-group, and large-group activity to take into account the student's need for independence and preferences for mode of instruction.

___ 1.12 Provides for appropriate use of printed materials, audiovisual materials, and direct experiencing to take into account the student's preferred modes of learning--visual, auditory, tactual, or kinesthetic.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. Highly Desirable
B. Desirable
C. Somewhat Desirable
D. Somewhat Undesirable
E. Undesirable
F. Highly Undesirable

COMPONENT 2: CURRICULAR ARRANGEMENTS

COMPREHENSIVE OBJECTIVE:

The curriculum is structured to meet state and district requirements but it can be adapted by the school and individual teachers to take into account the differing educational needs of students.

ILLUSTRATIVE ENABLING OBJECTIVES:

The curricular arrangements facilitate individual educational programming in the following areas:

___ 2.1 Communication skills, including reading, writing, speaking, and listening.

___ 2.2 Mathematical concepts and skills.

___ 2.3 Scientific and technological concepts and skills, including computer technology.

___ 2.4 Social science concepts and skills.

___ 2.5 The expressive and performing arts, including aesthetics, art, dance, drama, and music.

___ 2.6 Foreign languages.

___ 2.7 Career education, including awareness, exploration, and preparation.

___ 2.8 Health education, including physical and mental.

___ 2.9 Family and home membership.

___ 2.10 Leisure education, including crafts, clubs, and extracurricular activities.

Related to the preceding areas, local school curriculum committees, teams of teachers, and individual staff members:

___ 2.11 Identify or prepare content outlines, organized in the form of taxonomies, other hierarchies, or topical outlines.

___ 2.12 Identify or formulate course and unit objectives.

___ 2.13 Identify or prepare instructional materials, including printed and audiovisual materials, that individual students use to attain their objectives.

___ 2.14 Formulate instructional methods, including the use of time and materials, that enable individual students to attain their learning goals.

___ 2.15 Formulate procedures for identifying course and unit objectives that are appropriate for each individual student.

___ 2.16 Prepare learning guides that the students and the teacher use at the beginning of each course to plan each student's instructional program.

COMPONENT 3: EXPERIENTIAL LEARNING AND CAREER EDUCATION

COMPREHENSIVE OBJECTIVE:

Career education is arranged for all students; experiential learning activities and work experience in the community are arranged for each student who can profit from them.

ILLUSTRATIVE ENABLING OBJECTIVES:

District and local school policies and practices have been developed that facilitate effective:

___ 3.1 Career awareness, exploration, and preparation, including work experience.

___ 3.2 Student participation in cultural, recreational, service, or other nonwork activities in the community.

___ 3.3 Participation of community personnel in school activities and of school personnel in community activities.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. Highly Desirable
B. Desirable
C. Somewhat Desirable
D. Somewhat Undesirable
E. Undesirable
F. Highly Undesirable

___ 3.4 Use of community material resources and facilities.

___ 3.5 Preparation of community personnel who participate in the educative process.

The local school staff, with appropriate participation by school district personnel and others:

___ 3.6 Identifies program and course objectives to guide its career education activities.

___ 3.7 Uses effective counseling and advising procedures in planning each student's individual educational program, including career education.

___ 3.8 Uses instructional methods, materials, and community resources in courses and other educational activities that facilitate the individual student's attainment of his/her goals related to career education.

COMPONENT 4: STUDENT DECISION-MAKING ARRANGEMENTS

COMPREHENSIVE OBJECTIVE:

Students progressively assume more initiative for planning, implementing, and evaluating their programs and activities with a lesser amount of adult direction and control.

ILLUSTRATIVE ENABLING OBJECTIVES:

Students in their classes and in meetings with their advisors are taught:

___ 4.1 Decision-making skills that help them to make educational decisions as individuals.

___ 4.2 Concepts and skills that enable them to participate in shared decision making with other students, the school staff, and parents.

The individual student exercises increasing initiative for making decisions, accepting the related consequences of the decisions, and evaluating decisions regarding:

___ 4.3 The student's instructional program in each course.

___ 4.4 The student's educational program for the semester.

___ 4.5 The student's educational program for the school year.

Students as members of groups take increasing initiative for making decisions, accepting the responsibility for the decisions, and for evaluating the decisions regarding:

___ 4.6 The objectives and activities in the course in which the group is enrolled.

___ 4.7 The extra-curricular activity in which the group participates.

___ 4.8 The governance of the group.

Students are encouraged to serve:

___ 4.9 As officers and to participate as members of student-governing groups.

___ 4.10 As student representatives on the school's standing and ad hoc committees, councils, and task forces.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A.	Highly Desirable	D.	Somewhat Undesirable
B.	Desirable	E.	Undesirable
C.	Somewhat Desirable	F.	Highly Undesirable

COMPONENT 5: EVALUATING STUDENT LEARNING AND EDUCATIONAL PROGRAMS

COMPREHENSIVE OBJECTIVE:

The individual student's progress toward attaining his/her course objectives, the student's instructional program in each course, the student's total educational program, and the school's total educational program are evaluated systematically and the results of the evaluation are used in improving the educative processes of the school.

ILLUSTRATIVE ENABLING OBJECTIVES:

Appropriate measurement and evaluation techniques are used:

___ 5.1 To evaluate each student's progress toward attaining his or her learning goals in each course.

___ 5.2 To evaluate each student's instructional program in each course.

___ 5.3 To evaluate each student's educational program each semester in terms of the student's attainment of his or her goals, and in terms of the appropriateness and value of the program for the student.

___ 5.4 To evaluate each student's total educational program for the complete school level, i.e., middle school, high school.

___ 5.5 To evaluate elements of the school's total educational program.

The results of the evaluation of each student's educational program each semester are used, primarily by teachers and students:

___ 5.6 To set goals for each student to achieve the next semester.

The results of the evaluation of the school's total educational program are used by teachers and other school staff:

___ 5.7 To set goals annually for composite groups of students to attain, such as those of a particular grade in school or those taught by a teaching team.

___ 5.8 To evaluate each group's attainment of the goals.

The results of all evaluation activities are used by teachers and other school staff:

___ 5.9 To evaluate the effectiveness of the curriculum, instruction, and other elements of the school's educational program.

___ 5.10 To improve the curriculum, instruction, and other elements of the school's educational program.

___ 5.11 To improve the school's advising, organization, and administrative structures and processes.

COMPONENT 6: ADMINISTRATIVE ARRANGEMENTS

COMPREHENSIVE OBJECTIVE:

The school's administrative arrangements provide for cooperative planning and shared decision making by the persons responsible for implementing the plans and decisions that are made, mainly administrators, counselors, teachers, and students.

ILLUSTRATIVE ENABLING OBJECTIVES:

The school:

___ 6.1 Is organized into administrative units, each of which has no more than 500 students.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. Highly Desirable	D. Somewhat Undesirable
B. Desirable	E. Undesirable
C. Somewhat Desirable	F. Highly Undesirable

___ 6.2 Has one or more committees, composed of representatives of the administrative team, counselors, teachers, students, and parents that make decisions and formulate plans regarding the school's curriculum, instruction, advising, evaluation, organization, and staffing.

An Educational Improvement Committee, or other committee or council that has representatives of the administrative team, curriculum coordinators, counselors, and teachers:

___ 6.3 Plans the school's educational improvement activities with input from the total faculty.

Students, parents, and citizens:

___ 6.4 Participate in meetings of the Educational Improvement Committee when matters of concern to them are on the agenda.

___ 6.5 Serve as regular members of the Educational Improvement Committee.

One or more district committees, composed of the district administrator, representative principals, curriculum coordinators, counselors, teachers, students, parents, and citizens:

___ 6.6 Coordinate the improvement activities of the district, taking into account district policies and state requirements.

___ 6.7 Secure district and other specialists for consultation regarding improvement activities.

The principal provides leadership and, with appropriate involvement of members of the Educational Improvement Committee and the school staff:

___ 6.8 Establishes policies and procedures that facilitate the school's educational improvement efforts.

___ 6.9 Coordinates the use of facilities, materials, equipment, supplies, and other resources.

___ 6.10 Provides time, space, and other physical arrangements that are needed for teaching teams, school committees, and other groups to meet and conduct their business during the school day.

___ 6.11 Establishes effective two-way communication among administrators, other staff, teachers, and students; and between the school and parents and citizens of the community.

___ 6.12 Participates as a member of district committees.

___ 6.13 Transmits information to and from district committees.

___ 6.14 Attempts to have implemented the decisions made by district committees.

COMPONENT 7: ORGANIZATION FOR INSTRUCTION AND STUDENT ADVISING

COMPREHENSIVE OBJECTIVE:

The faculty and students are organized into small groups that permit instruction and advising to be personalized.

ILLUSTRATIVE ENABLING OBJECTIVES:

A member of each teaching team and/or advising group:

___ 7.1 Chairs the meetings of the group.

___ 7.2 Serves on the school's Educational Improvement Committee and participates in the Committee's planning and other activities.

___ 7.3 Transmits information, decisions, and plans from the teaching staff to the Educational Improvement Committee.

___ 7.4 Transmits information, decisions, and plans to the teaching staff.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. Highly Desirable
B. Desirable
C. Somewhat Desirable
D. Somewhat Undesirable
E. Undesirable
F. Highly Undesirable

7a. Related to instruction, each group of teachers, such as an interdisciplinary teaching team, cooperatively:

___ 7.5 Develops the procedures for planning, monitoring, and evaluating each student's instructional program in each course taught by the group.

___ 7.6 Plans and evaluates the group's instructional strategies.

Related to the group's instructional functions, each teacher:

___ 7.7 Outlines the content of his or her courses.

___ 7.8 Develops the learning guides that students use in the courses.

___ 7.9 Plans the instructional methods that are employed in the courses, including the use of time, materials, and modes of instruction.

___ 7.10 Participates in all aspects of the group's planning and evaluation activities.

___ 7.11 Carries out his or her instructional activities in accordance with the group's plans.

7b. Related to advising, each group of teachers, such as an interdisciplinary team, plans the group's advising activities related to:

___ 7.12 Providing educational advisement.

___ 7.13 Increasing schoolwide communication.

___ 7.14 Improving home-school-community relations.

___ 7.15 Enhancing the personal and social development of students.

Related to advising functions, teachers, with assistance of a guidance counselor:

___ 7.16 Serve as advisors to a group of students.

___ 7.17 Assume responsibility for planning, monitoring, and evaluating each of his or her advisee's individual educational programs.

COMPONENT 8: HOME-SCHOOL-COMMUNITY RELATIONS

COMPREHENSIVE OBJECTIVE:

Effective communication and cooperative educational efforts between the school and the community are carried out as part of a program of home-school-community relations.

ILLUSTRATIVE ENABLING OBJECTIVES:

A comprehensive program of home-school-community relations:

___ 8.1 Is formulated and monitored by a school committee composed of representative school staff, parents, and students.

___ 8.2 Provides for frequent and effective communication between the school and community.

___ 8.3 Encourages the school staff to participate in the analysis of the home and neighborhood conditions of their students.

___ 8.4 Encourages parents and other community persons to participate in in-school educational activities and to provide suggestions to aid in decision-making.

___ 8.5 Involves parents in planning the individual educational program of their child.

___ 8.6 Provides for student progress to be reported to parents regularly and effectively.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. Highly Desirable
B. Desirable
C. Somewhat Desirable
D. Somewhat Undesirable
E. Undesirable
F. Highly Undesirable

COMPONENT 9: INTERNAL AND EXTERNAL SUPPORT ARRANGEMENTS

COMPREHENSIVE OBJECTIVE:

The environment for learning and instruction in the school and for work and other educational experiences in the community is enriched through the intellectual, technical, and material support provided by school and school district groups, and by external agencies, such as the state education agency, intermediate agencies, teacher education institutions, and professional education associations.

ILLUSTRATIVE ENABLING OBJECTIVES:

The school district and local school make provisions for:

___ 9.1 The Educational Improvement Committee, or other group, to meet weekly during school hours to plan and carry out its activities.

___ 9.2 Each teaching team, or other group, to have a common time for carrying out their preparation, planning, evaluation, and other activities.

___ 9.3 Each advisor to meet regularly with his or her advisee group and individual advisees.

___ 9.4 Teachers to receive assistance in carrying out their educational improvement activities.

The state education agency takes initiative with local school districts for activities such as:

___ 9.5 Developing strategies for stimulating the educational improvement activities of local schools.

___ 9.6 Providing financial and technical support to local schools in carrying out their educational improvement activities.

___ 9.7 Encouraging job descriptions to be changed, if necessary, to enable teachers to participate in student advisement and in educational improvement activities.

___ 9.8 Reviewing and changing the licensing requirements of currently-licensed educational personnel and developing new licensing programs to meet changing societal conditions and related demands on education.

Teacher education institutions, working cooperatively with local schools and the state education agency, take initiative for activities, such as:

___ 9.9 Evaluating their programs to prepare administrators, counselors, teachers, and other educational personnel; revising existing programs; and developing new programs to meet changing societal conditions and related demands on education.

___ 9.10 Developing and offering credit and noncredit courses designed to meet the needs of prospective educational personnel and inservice personnel to participate effectively in educational improvement activities.

___ 9.11 Arranging with local schools for cooperative preparation of student teachers and interns.

Professional education associations at the local, state, and national level take initiative for activities such as:

___ 9.12 Providing leadership to their members in carrying out educational improvement efforts.

___ 9.13 Identifying and publicizing local schools that demonstrate educational improvement.

___ 9.14 Influencing local, state, and federal legislation to support educational improvement.

___ 9.15 Encouraging the adoption of contract provisions which facilitate educational improvement.

DESIRABILITY OF COMPREHENSIVE AND ENABLING OBJECTIVES

Directions: Enter the letter A-F in the _____.

A. Highly Desirable
B. Desirable
C. Somewhat Desirable
D. Somewhat Undesirable
E. Undesirable
F. Highly Undesirable

COMPONENT 10: RESEARCH AND DEVELOPMENT

COMPREHENSIVE OBJECTIVE:

Knowledge is extended regarding learning, instruction, school structures and processes, and other factors related to schooling through research and development conducted by school personnel and cooperating individuals and agencies.

ILLUSTRATIVE ENABLING OBJECTIVES:

The school staff:

___ 10.1 Develops the capability for carrying out its own evaluative research and related improvement activities.

___ 10.2 Participates with district personnel and other individuals and agencies in research and development specifically directed toward educational improvement in their school.

___ 10.3 Participates with individuals and agencies in research directed toward extending knowledge concerning schooling and the educative process.

Appendix B

List of Tables in Supplementary Tabular Information to Accompany the Research Monograph: Improvement of Secondary Education through Research: Five Longitudinal Case Studies

by Klausmeier, H. J., Serlin, R. C., & Zindler, M. C. (1982)

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